MINISTRY OF COAL

CHAPTER: II

Coal India Limited

CoalNet Project

Highlights

Absence of proper planning and monitoring, inadequate study of business processes across the Coal India Limited subsidiaries, inadequate involvement of user companies in the process of development of application software, resulted into delay and partial implementation of CoalNet Project. Expenditure towards procurement/hiring of hardware and software remained unfruitful.

(Para 2.7.1 and 2.7.2)

Incorrect mapping of business rules resulted in payment of allowances to non-entitled employees.

(Para 2.7.4)

Inadequate input controls and lack of validation checks resulted in incomplete data, duplication of data in respect of name, Provident fund numbers, Bank account numbers, Permanent account number *etc.*, and made the data unreliable.

(Para 2.7.5)

There was ineffective disaster recovery and business continuity plan, backup and password policy.

(Para 2.7.6)

2.1 Introduction

Coal India Limited (Company) is the holding Company for eight subsidiaries♣ situated in different parts of the country. The function of the Company includes monitoring of mining and non-mining projects implemented by its subsidiaries, centralised purchasing of Heavy Earth Moving Machinery (HEMM), explosives, establishing coal linkages for supply of coal through concerned subsidiaries, maintaining statistics on coal production, removal of over burden *etc.*

Computerisation in the Company started initially in 1988-89. To enable use of Information Technology (IT) for improving administrative efficiency in the organisation,

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♣ *Central Coalfields Limited (CCL) Ranchi, Mahanadi Coalfields Limited (MCL) Sambalpur, Northern Coalfields Limited (NCL) Singrauli, South Eastern Coalfields Limited (SECL) Bilaspur, Eastern Coalfields Limited (ECL) Sanctoria, Western Coalfields Limited (WCL) Nagpur, Bharat Coking Coal Limited (BCCL) Dhanbad, Central Mine Planning & Design Institute Limited (CMPDIL) Ranchi.*

a Committee headed by the Secretary, Ministry of Coal & Mines (MoC), decided in November 2000 to implement computer network project 'CoalNet' for data sharing between the MoC, Company and its subsidiaries. As per directive from MoC, bids were invited from two Government organisations, Indian Institute of Technology (IIT), Kharagpur and National Informatics Centre (NIC), New Delhi. Work order for an amount of Rs.8.95 crore was issued by the Company on IIT, Kharagpur on 3 July 2001 for implementation of CoalNet in the Company and its subsidiaries Headquarters. Under Phase I duration of the project was two years including maintenance support. The first Phase of the project was scheduled to be completed within 12 months from the date of awarding work order. For its implementation, a top down approach was adopted to form the backbone of the information infrastructure, over which a Decision Support System (DSS) could be built to enhance the quality and effectiveness of decision-making. It was decided that 'CoalNet' project would be designed as an integrated application system using Java based technology with Oracle at the back end with multi-tier architecture.

It was also decided that 'CoalNet' comprising 13 modules[*], would be implemented in three Phases. In first Phase, linkage was to be established between MoC, Company and Subsidiaries' Headquarters to communicate data and voice along with the video conferencing facility. In second Phase, the 'CoalNet' was to be extended from Subsidiaries Headquarters level to Areas[♦]/loading point level. In the third Phase, CoalNet was to be implemented in collieries. Initially, implementation of this application software was optional, but later on it was made compulsory for all the subsidiaries. It was also decided that any software developed, independently or with outside help, by any subsidiary should necessarily be compatible with CoalNet.

2.2   Objectives of CoalNet

The main objectives of CoalNet were catering to an integrated information requirement of Department of Coal, MoC, Company and its subsidiaries and standardisation of process, platform, technology and application across the corporate level of the Coal Industry.

2.3   Objectives of audit

The objectives of audit were to verify whether:

(i)   The CoalNet had been designed and was functioning in terms of the stated objectives.

(ii)   The business rules have been correctly mapped and information/reports generated were reliable, complete and accurate.

(iii)   The general controls were adequate, reliable, and security aspects were properly taken care of.

(iv)   To identify the bottlenecks for delayed/ partial/ non-implementation of CoalNet.

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[*] *Finance, Production, Project, Personnel, Payroll, Corporate Plan, Grievance, VVIP Information, Equipment, Material Management System, Sales and Marketing, Parliamentary Affairs Division, Management Information System*
[♦] *Area comprises one big or several small coal mines*

2.4 Scope of audit

None of the modules had been fully implemented (till June 2008) and used across all the subsidiaries. Some of the partially implemented modules, as mentioned below, have been covered in audit.

(i) Payroll: Bharat Coking Coal Limited (BCCL), Mahanadi Coalfields Limited (MCL), Central Coalfields Limited (CCL) Ranchi, Central Mine Planning & Design Institute Limited (CMPDIL) Ranchi and the Company (Headquarters) (Phase I)

(ii) Material Management System (MMS): MCL (Phase I) and BCCL (Phase II)

(iii) Sales & Marketing: BCCL, MCL and Eastern Coalfields Limited (ECL)(Sales Office), Kolkata (Phase I)

(iv) Production: BCCL (Phase II), MCL (Phase I) and CCL (Phase I)

(v) Equipment : CCL (Phase I)

(vi) Finance: Company (Headquarters) and CMPDIL (Phase I)

2.5 Audit criteria

While conducting IT audit following criteria were kept in view:

(i) Business rules and procedures;

(ii) Accounting policy and orders/circulars/notification issued from time to time by the competent authority; and

(iii) Best practices for Information Technology development and implementation.

2.6 Audit methodology

Field audit of CoalNet Application software was conducted by adopting following methodology:

(i) Study and scrutiny of records/ documents;

(ii) Discussion with officials of System Department in charge of various modules as well as officials of concerned department; and

(iii) Data extraction and analysis thereof through Computer Assisted Audit Techniques (CAAT) followed by verification of records, whereby necessary.

2.7 Audit findings

2.7.1 Implementation of CoalNet

Implementation of Phase I of the CoalNet project was scheduled to be completed by July 2002, which was later extended to March 2003 and then December 2004. Phase II was to be completed by March 2005, but later extended to March 2006. It was noticed that:

(i) As per work order, under Phase I, 13 modules were to be implemented in each of the subsidiaries and the Company Headquarters aggregating to 117 modules. But only 21 modules♣ were implemented as on April 2008. In spite of this, an amount

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♣ *CIL-3, CCL-4, WCL-1, SECL-5, MCL-4, NCL-1 and CMPDIL-3*

of Rs.6.55 crore was paid to IIT for implementation of Phase I against total contracted amount of Rs.8.95 crore for Phase I; and

(ii)   Out of ten modules to be installed in 36 areas of different subsidiaries under Phase II only the MMS module was implemented in eight stores of CCL though an amount of Rs.4.11 crore was paid to IIT as on March 2008.

The reasons for the delays were as follows:

(i)   Though the work orders for Phase I was placed on 3 July 2001, the Company took 17 months in selection of back-end database for CoalNet as Oracle. The actual work of implementation in subsidiaries started between October 2003 and September 2004 only;

(ii)   The software was not thoroughly tested before implementation at the site which resulted in number of bugs in the software. Further, frequent changes of personnel in IIT team hindered the process of implementation. In absence of any provision in the work order the Company could not enforce IIT to deploy manpower on continuous basis;

(iii)   According to clause 14 of the work order dated 3 July 2001 placed on IIT, User Training and Maintenance Training would have to be imparted. But it was noticed in audit that no training was provided in MCL, WCL and CCL; and

(iv)   No effective mechanism was developed to monitor and supervise the development and implementation of different milestones of the project either at the Company Headquarters or at subsidiary Company. In ECL non-availability of servers delayed the implementation. In NCL, no bridging programme was developed to make their ERP solution (IBS) compatible with CoalNet. In WCL, CoalNet became non-functional in July 2007 due to crash of application server because accepted standard procedure was not being followed for back up of data.

It was also noticed that due to non-implementation of wide area network connectivity among the Areas under CoalNet Phase II, stores worth Rs.17.21 lakh lying for more than five years as on 31 March 2008 at Lodna area of BCCL could not be utilised by other areas needing these while Katras area of BCCL purchased the same.

2.7.2   *Inadequate study of business processes and non-involvement of users*

The basic requirement for re-engineering of the business processes for implementing an ERP solution across all subsidiaries ensuring standardisation and uniformity in business processes as far as possible and also providing for exceptions at various subsidiaries in the same application was not followed by the Company. Documents like user requirement specification, system requirement system and study design and development were prepared by IIT and approved by the Company. But, the specific and local requirements of subsidiaries were not incorporated in the above mentioned documents, based on which the application package was developed by the vendor. As non-uniform business processes required modifications, changes and customisation in the various modules of the CoalNet at subsidiaries ultimately delayed the project.

2.7.3   *Inadequate documentation*

Operational manuals on different modules were prepared by the IIT. But, due to the specific requirements of subsidiaries, number of changes were incorporated in the

standard application package. However, operational manuals were not updated resulting in deficient utilisation of the package. Further, any modification to the system would also be difficult and inconsistent in the absence of documentation of the latest version of system design and changes.

2.7.4 Incorrect business rule mapping

It was also noticed that business rules were incorrectly mapped in Payroll module of the CoalNet. The module was designed for preparation of pay slip. Analysis of database revealed the following discrepancies in payroll module of subsidiary company.

2.7.4.1 Payment of washing allowance to non-entitled employee

As per NCWA♣ agreement, certain employees e.g. peon, driver, nurse, para-medical staff, security personnel *etc.,* who were required to wear Uniform were alone entitled for washing allowance.

Due to incorrect mapping of above business rule in the system, washing allowance was paid to some categories of non-entitled employees of MCL Headquarters and the Company Headquarters. The same was subsequently recovered at MCL. However, the deficiency in the system was not rectified.

2.7.4.2 Payment as well as recovery of House Rent Allowance to/from non-entitled employee

According to NCWA agreement House Rent Allowance (HRA) is payable to the employees who are not allotted Company's accommodation. Due to incorrect mapping of this rule, HRA was shown as paid erroneously to the employees who were also allotted Company accommodation in MCL Headquarters, BCCL, CCL, CMPDIL and the Company's Headquarters.

2.7.4.3 Excess overtime payment

Regulations regarding overtime (OT) payment provide for ceiling in respect of monthly rated workers/staff/officers. Non mapping of this ceiling in the system resulted in excess payment of OT in MCL.

MCL Management replied (8 September 2008) that the monthly working days for non-executives should be taken as 26 instead of 30. However, there was still over payment of OT even after considering monthly working days as 26.

2.7.5 Input controls and validation checks

Input control ensures that the data received for processing are complete, accurate, properly authorised and entered timely without duplication. Validation check ensures that the data entered are valid within the prescribed range/limits. Inadequate input and validation controls noticed in different modules are mentioned below:

2.7.5.1 Payroll module

Instances of inadequate input controls in the system are given below**:**

(i)   In case of 5435 out of 59213 employees in CCL the designation as well as department of employees was entered as '0';

♣ *National Coal Wage Agreement*

(ii)   Different Provident Fund (PF) numbers were allotted to the same person in case of 58 out of 77300 employees in BCCL;

(iii)   Different Codes were designed for same discipline of activity in BCCL in 94 out of 213 cases;

(iv)   Same PF number was allotted to more than one employee in 178 cases in BCCL and 263 cases in MCL out of 77300 and 23840 cases respectively;

(v)   No PF number was entered against 12572 employees out of 77300 employees in BCCL and 2608 employees out of 23840 employees in MCL;

(vi)   Same Permanent Account Number (PAN) was entered for 167 out of 59213 employees in CCL and for 10 out of 3624 employees in CMPDIL;

(vii)   System accepted date of joining of an employee as a date preceding date of birth in 315 cases and also same as date of birth in 152 cases in CCL out of 59213 records; and

(viii)   MCL Management accepted (September 2008) that there was same PAN for different employees by mistake. However, they were in the process of 'thorough checking' of data to make the things right.

2.7.5.2 Sales module

Sales module deals with road sales to both linked* and unlinked parties. Inadequate input controls and validation checks in the system are shown below:

(i)   Irrelevant & incomplete data were entered in address field in 500 records out of 38720 in BCCL and in 897 records out of 19204 in CCL;

(ii)   PAN was not entered in 36871 records out of 38720 in BCCL and in 14945 records out of 19204 in CCL;

(iii)   Duplicate PAN was entered against 285 records out of 38720 in BCCL and in 48 cases out of 19204 in CCL;

(iv)   No delivery order code was mentioned in 2488 cases out of 12796 in CCL;

(v)   Customer code field was kept blank in 207 cases out of 17707 in ECL; and

(vi)   System accepted railway receipt date as a date preceding loading date in ECL.

2.7.5.3. Production module

This module provides for periodical review of target distribution and capturing daily coal production and over burden removal data, shortfall analysis *etc*. Data analysis revealed that:

(i)   In the database of CCL due to inadequate input controls, no production time was entered. Thus, all the shifts were entered as 'G' indicating General Shift which was not correct as the project was running round the clock and shift-wise dispatch should be entered according to the shifts viz. 1st /IInd or IIIrd shift.

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* *Linked Party-Core sector and few other coal consumers were linked to a particular colliery of a Company for meeting their demand of coal.*

(ii)   The dispatch mode was entered as 'General' only though the dispatches were done through different modes like, Rail, Road *etc.*

(iii)   The washery code and coalfield code were not standardised**.**

It was further noticed that area wise Coal and OBR production of MCL and CCL for the year ended 31 March 2007, as compiled in the Performance Report at the Company's Headquarters, did not match with those in CoalNet.

2.7.5.4 Material management module

The MMS module deals in monitoring status of indent, comparative analysis of subsidiary-wise inventory and consumption, monitoring subsidiary-wise critical stock items *etc.*

CoalNet Phase II was planned for implementation in 36 areas (BCCL-14, CCL-10, MCL-10 and ECL-2). The status report showed that in none of the areas MMS has been properly implemented except CCL, where this was implemented in few areas. Deficiencies revealed during data analysis in CCL are highlighted as follows:

(i)   Same vendor was allotted different vendor codes in 49 cases out of 751 in CCL;

(ii)   Item location, lead time in procurement, vendor identity and equipment code were kept blank in CCL and BCCL;

(iii)   Inventory Controls like HML/FSN/VED/ABC analysis were not linked with the actual transaction and minimum, maximum re-order and safety levels were not fixed in CCL and BCCL;

(iv)   Part number of material was not entered in 6577 items out of 35992 in CCL and in 98561 items out of 113953 issued in CCL;

(v)   Vital details like inspection note number, date of inspection, inspected by whom *etc.* were kept blank in CCL;

(vi)   Same indent was issued on different dates in 14 cases out of 381in CCL;

(vii)   There was mismatch between quantity received at stores and quantity accepted on inspection in case of 138 stores items out of 21825 in CCL; and

(viii)   Number of items issued from stores was more than that requisitioned by the user department in respect of 144 stores items out of 113950 in CCL.

It was noted in Audit that there was difference between consumption quantities shown in the database and the same calculated by Audit taking into account the opening stock, receipt/transfer in, return and issue/transfer out of the item.

The Management of CCL replied (September 2008) that (i) though many vendors had same name but their addresses were different and (ii) data for inventory control management, like ABC, VED *etc.* were not fed into the system. The Management's view is not acceptable in view of the fact that (i) different code and identity existed for exactly same vendor name and address and (ii) necessary data needed to be fixed and fed in the system for effective use of the module.

2.7.5.5 Equipment module

This module pertains to planning and processing of equipment maintenance tasks, capacity planning and scheduling, recording data to build up a maintenance system, representing and managing equipment in a structured manner *etc.*

The deficiencies in input controls in Equipment Module of CCL are highlighted as follows:

(i)   In 247 cases out of 1355 same machine serial number was allotted to different equipment; and

(ii)   In 131494 cases out of 135492, hours worked by Heavy Earth Moving Machinery were not entered.

Thus, deficient input controls in all modules coupled with deficient validation checks made the data base incomplete, incorrect and unreliable. This also resulted into inconsistent results that could not be used for any Management Information System or Statements.

2.7.6   Information system security control

CoalNet application software has three levels of security viz. application level, module level and database level security. Role-based access or user-based access in CoalNet could be provided through data base administrator and in both the cases, function wise access can also be provided to users by assigning the roles of data entry, authentication, approval *etc.* There is an automatic password expiration procedure built in the system which enables automatic expiry of passwords after certain interval of time.

However, it was noticed that despite the adequate inbuilt security features, such facilities were not used. It was also noticed that records had been deleted from the database by getting access to the back-end that resulted in gap in identities. Authorisation for accessing back-end data was not on record, which made the system unsecured and vulnerable to manipulation of data with malafide intention. No password and back up policy had been formulated till the end of the audit. Because of not adhering to the standard back up and data recovery procedure, WCL had lost substantial data and struggled for recovery of the same.

2.7.7   General observations

2.7.7.1 Unfruitful expenditure on procurement/hiring of hardware materials in BCCL and MCL

BCCL

The BCCL Management hired 17 Sun servers for a period of 60 months for a total rental value of Rs.11.81 crore (installed in September 2003). Due to non-implementation of Phase II in different areas the servers were not utilised at all and the hire period also expired in September 2008.

MCL

Though Phase I of the project was not implemented successfully, MCL procured hardware worth Rs.3.95 crore, including annual maintenance contract, which is now lying idle for more than two years due to non-implementation of Phase II.

2.7.7.2 Foreclosure of agreement with IIT

It was observed that except in CCL, IIT had withdrawn on-site support from all subsidiaries in June 2007. It was also noticed that the Company and its subsidiaries had no in-house expertise to maintain and customise CoalNet application software. In view of above, the Board of Directors of the Company in their Meeting held on 11 July 2008 approved foreclosure of the agreement in respect of implementation of CoalNet Phase I and Phase II and engagement of Electronic Corporation of India Limited for maintenance support to the subsidiaries where CoalNet was in use. Poor management resulted in not fixing the user requirements well in advance and poor monitoring of the implementation led to the delays and foreclosure of agreement with IIT Kharagpur, while the CoalNet was yet to be implemented completely in the Company and its subsidiaries even after seven years.

2.8   Conclusion

Even after seven years Phase I of CoalNet was not implemented completely in any of the subsidiary companies till now (July 2008). Non standardisation of the business process, platform, technology and application across the corporate level as envisaged combined with acceptance of User Requirements without considering the specific requirements of the subsidiaries led to lot of changes in the software and resulted in non uniformity of CoalNet in the implemented areas. Lack of proper input control, deficiency in validation checks and incorrect mapping of business rules made the data incomplete and unreliable in implemented areas. Absence of standard back up procedure made the data unsafe against disasters. Lack of adequate training on CoalNet and non-availability of user manuals also indicated the absence of business continuity plan. Inadequate monitoring of the implementation resulted in slow pace of implementation and ultimately led to foreclosure of the agreement with the implementation agency, i.e., IIT. Thus, the implementation of CoalNet remained unfruitful even after seven years and spending Rs.39.58 crore (Rs.10.66 crore on implementation and Rs.28.92 crore on procurement of Hardware/Software).

2.9   Recommendations

- The Company should review the status of implementation of balance modules and draw up a well defined strategic plan to customise the CoalNet after identifying the specific requirements of subsidiaries within a defined time frame.

- The Company should arrange for training of their personnel in CoalNet project. A detailed user manual and system operation manual should be prepared and documented.

- Input control and validation checks should be built in order to ensure correctness, completeness and integrity of data.

- Policy and procedures regarding data security, password management, back up and data recovery should be formulated and implemented.

The matter was reported to the Ministry in December 2008; reply was awaited (January 2009).