Chapter 2
Computerised Applications over Indian Railways

2.1   Highlights

Information Technology (IT) strategy for development of standardised and uniform applications on the Indian Railways was ineffective leading to haphazard development of applications in zonal railways with overlapping functions.

(Para 2.6)

Users were not involved at the development stage and the applications developed were not comprehensive. Some of the applications were only partially implemented.

(Para 2.7)

General controls were deficient. Physical access and logical access controls were inadequate and proper segregation of duties was not ensured enabling Assistant Programmers in some zonal railways to access live data, which was fraught with risk. There was no documented change management policy, disaster recovery plan or an environment policy to dispose of e-waste.

(Para 2.8)

The Payroll and Provident Fund Accounting System implemented by North Eastern Railway on Lucknow and Varanasi divisions had inherent deficiencies. Salary and allowances were drawn beyond entitlements, recoveries were improperly affected and advances were incorrectly regulated adversely affecting the integrity of the system.

(Para 2.9.1)

Application controls in the Material Management Information System adopted by Southern Railway and the one developed by Diesel Locomotive Works, Varanasi were weak. Priced ledger numbers were improperly allotted, check digits were incorrectly assigned, the master tables contained several inconsistencies and the applications allowed incorrect data entry. As a result the utility value of the information that could be derived from these applications was limited.

(Para 2.9.2)

The Financial Accounting System developed by Rail Coach Factory, Kapurthala had several deficiencies and transactions processed were not consistent with extant rules. Deficiencies existed in Provident Fund, Loans and Advance, Stores and Bill passing/budget modules casting doubts on data integrity.

(Para 2.9.3)

The Freight and Passenger Accounting System developed by Western Railway had various deficiencies due to non-incorporation of relevant

rules governing the apportionment of earnings into the application resulting in incorrect apportionment of earnings to zonal railways.

(Para 2.9.4)

The data captured in the Hospital Information Management System developed by South Eastern Railway was incorrect and incomplete rendering the system unreliable.

(Para 2.9.5)

2.2   Gist of recommendations

* Railways should draw up a well defined IT strategy plan clearly identifying the functional areas requiring standard applications and those areas where applications could be developed locally by zonal railways. The strategy plan should be in line with business plan of the Railways and should set out the milestones clearly.

* Railways should ensure that users are involved at the development stage and that the applications developed address all operational requirements. Railways may formulate standard guidelines addressing the aspects that should be taken into consideration for systems development in line with the standard IT practices.

* Railways need to strengthen the security of the IT systems, particularly the access to the systems comprising both physical access as well as logical access. Railways need to draw a change management policy in line with the importance of the applications, a structured continuity and disaster recovery plan with off site back up sites and a policy for disposal of e-waste in line with international practices.

* Railways should strengthen its existing validation checks in the computerised systems and build in additional checks so that the deficiencies and inconsistencies pointed out in the systems are eliminated and data integrity is enhanced. All the relevant rules and codal provisions should be incorporated in the applications to achieve compliance with rules. All the applications need to go through systematic field trials before being made operational in live environment.

* Railways should ensure optimum utilisation of the applications by exploiting all their features in order to achieve their objectives.

2.3   Introduction

Over the years, the Railways have been developing computerised applications for various functions. In 1997, Railway Board had constituted System Development Teams (SDTs) at Northern Railway, Southern Railway, South Eastern Railway and Central Railway for developing major applications as pilot projects for subsequent adoption in other zonal railways so that a uniform standardised system becomes available on Indian Railways. The rationale was that since the entire Railway network functions in a homogenous environment and since the framework of rules and regulations is common, a uniform and integrated system would have attendant advantages for control at the Railway Board level. The zonal railways were also allowed to implement various computerised applications to manage different functions locally.

For the purpose of Information Technology (IT) audit of systems across the Railways, a sample comprising both applications developed by SDTs and developed locally by zonal railways was selected. This covered applications in use over Southern Railway (SR), North Eastern Railway (NER), Western Railway (WR), South Eastern Railway (SER), Diesel Locomotive Works, Varanasi (DLW) and Rail Coach Factory, Kapurthala (RCF). The sample was selected to cover various kinds of applications such as Material Management, Financial Accounting, Payroll and Provident Fund, Freight and Passenger Accounting and a Hospital Information Management System. Applications based on systems developed by SDTs as well as those developed locally were selected for the IT audit.

Southern Railway, which had locally developed and implemented an Integrated Material Management System (IMMS) in November 2000, adopted the Material Management Information System (MMIS) developed by the System Development Team of Central Railway, comprising five modules and entered into an agreement with M/s CMC, Mumbai in December 2003, for customising the application at a cost of Rs.0.11 crore. DLW a production unit, developed an MMIS system locally, in 1997, at a cost of Rs.0.47 crore (approx.) under DOS platform and FOXPRO as programming language as a decision support to the management for better management of inventory. The application consisted of four modules dealing with the accounting of stores transactions from generation of demand to receipt and issue of stores and monitoring the availability of stock in depots.

North Eastern Railway implemented the computerisation of Pay Roll and Provident Fund Accounting System on Varanasi and Lucknow Divisions by adopting the Pay Roll system developed in-house by the Systems Development Group, Secunderabad. The existing system is on a UNIX platform with COBOL as the programming language. The Pay Roll and Provident Fund Accounting systems were functioning independently and were not interlinked at the processing level.

Rail Coach Factory, Kapurthala developed an on-line Financial Accounting System (FACT) in December 2003 on the Oracle 9i platform. The application had eight modules, encompassing different financial activities, including receipt and payments of cheques and maintenance of suspense accounts.

Western Railway developed a Freight and Passenger Accounting System in July 1986 in COBOL language for accounting freight and passenger earnings and for correct and prompt apportionment of originating earnings to other railways.

South Eastern Railway implemented the Hospital Information Management System (HIMS) in April 1994 in a UNIX/Sybase environment at a cost of Rs.0.25 crore. The application was operated with three out of the 13 modules developed i.e. Patient registration, In-patient management and Radiology. Subsequently, the system was up-graded in 1996 and 2004 to function on Oracle 9i platform with only two modules i.e. Patient registration and Radiology.

2.4   Audit objectives

The IT applications developed by the various zonal railways as detailed above were reviewed with a view to assessing whether the

∗   IT strategy for development of standard applications and locally developed applications were adequate;

∗   applications developed were comprehensive and in consonance with the codal provisions;

∗   general controls in place to administer and implement the IT applications were adequate;

∗   application controls were adequate and effective; and

∗   applications developed were optimally utilised.

2.5   Audit scope and methodology

The scope included test check of the records and evaluation of the effectiveness of the general and application controls operating in the IT environment. In addition, substantial checking of data in master and transaction files was carried out using audit software tools-Interactive Data Extraction Analysis (IDEA) and Structured Query Language (SQL). The outputs generated by the applications were also reviewed, besides collection of information through questionnaires and interviews/discussions with the users to assess the systems.

2.6   Ineffective IT strategy

An IT strategy is vital for every organisation to ensure that the use of IT is aligned with the mission and business strategies of the organisation and to establish *inter se* priorities for computerisation of various applications within the scheduled time frame. The strategy would also help set out milestones and identify responsibility centres.

It was observed that the IT strategy for development of standardised and uniform applications on the Indian Railways was ineffective, leading to haphazard development of applications in zonal railways with overlapping functions. Further, the applications developed locally remained largely unimplemented and were not serving their intended purpose as brought out below:

∗   The SDT at SR, was made responsible for development of Pay Roll and Independent Modules (PRIME) and Advanced Financial and Railway Expenditure Management System (AFRES). These applications were to be stabilised on SR, before rolling out to the other zones. The deficiencies in this system have already been commented upon in audit in Report No 11 of 2006 – Union Government (Railways) of the Comptroller and Auditor General of India.

∗   As part of the rollout plan, Railway Board sanctioned Rs.2.95 crore for implementation of PRIME and AFRES on NER, by February 2005. However, the Board decided in March 2006, not to implement PRIME & AFRES and no expenditure was permitted to be incurred thereafter. Railways further decided (March 2006) to go in for centralised

38

implementation of these or similar applications along the lines of the PRS or FOIS, where there would be only one application centrally with all the zones accessing it. This work, Accounting/Administrative Information and Integration Management System (AIMS) would take care of the functions that the PRIME and AFRES were intended to take up. NER had by then incurred Rs.0.24 crore towards hardware, networking and on electric work for provision of uninterrupted power supply for PRIME and AFRES at Varanasi and Lucknow respectively, which was rendered infructuous.

* Similarly, the MMIS was to be developed and stabilised by CR and rolled out to the other zones. However, despite Railway Board's instructions (September 1997), that zonal railways should not enter into consultancy contracts or software development contracts in areas undertaken by SDT, SR entered into a software development contract, in January 1999, and pursued development of IMMS - a local variant of MMIS system developed by the Central Railways' SDT. At present, the system operating on SR is a mix of the Central Railway developed MMIS as well as the locally developed IMMS with select modules from both, thereby defeating the purpose of having a uniform system for the Railways as a whole.

* The application developed locally by WR for accounting of freight and passenger earnings and inter-railway apportionment of originating earnings suffered from various deficiencies due to non-incorporation of relevant rules governing the apportionment of earnings into the application leading to under-statement or over-statement of earnings of zonal railways. Railway Board on its part, after unsuccessfully attempting in March 2003, to develop another application namely Centralised Apportionment System (CAS) for apportionment of goods and passenger earnings, decided in March 2006 that the data centre set up under the AIMS project would also take care of the CAS applications. In June 2006, the Board separately directed that freight earnings should be accounted by Freight Operating Information System (FOIS) and passenger earnings should be accounted through Passenger Reservation System (PRS) and Unreserved Ticketing System (UTS), which were standardised applications implemented across all zonal railways. As a result, the local application developed by WR and CAS developed by Railway Board have become redundant.

Thus, the lack of a comprehensive strategy plan with clear milestones and responsibilities has led to haphazard development of applications resulting in duplication of efforts without any noticeable gains and the objective of having standardised uniform applications over Indian Railways was defeated.

Recommendations

Railways should draw up a well defined IT strategy plan clearly identifying the functional areas requiring standard applications and those areas where applications could be developed locally by zonal railways. The strategy plan should be in line with the business plan of the Railways and should set out milestones.

2.7	Deficiencies in system development

An understanding of the information requirements, system specifications and users' requirements from the application is a prerequisite for effective system development.

It was seen that users were not involved at the development stage and the applications developed were not comprehensive. They were either partially developed or had left out important aspects as brought out below:

* Railway Board sanctioned an amount of Rs.2.69 crore during 2004-05 to SR and prescribed a target date of 30 September 2005 for implementation of all the five modules of MMIS. Of this, SR had so far (September 2006) implemented only the Purchase module and the Depot module in 17 out of the 22 depots. While the 'Uniform', 'Sales and Auction' modules have not been implemented at all, SR was operating the 'Finance' and the 'Stores Accounts' modules in the IMMS, a locally developed application. Thus, computerisation of material management on SR was a mix of two applications, neither of which was completely adopted resulting in areas being left out entirely. Moreover, the partial implementation has resulted in sub-optimal utilisation of the application. The objective of standardisation across the Railways was also defeated.

  On the other zones also, the progress of implementation of MMIS shows that while some railways have yet to place the contracts (WR, NFR, NER and Metro Kolkata), other railways had implemented only one or two of the five modules to be implemented. Unless and until all the zones adopt and implement MMIS in a uniform pattern, the benefits of standardisation will not accrue.

* In DLW, a railway production unit, the MMIS is a completely locally developed application and had no links to the MMIS developed by CR. A review showed that the User Requirement Specifications (URS) and System Requirement Specifications (SRS) were neither prepared nor documented.

  Further, the application developed for the purpose of material management did not provide for such basic and essential data as the Anticipated Annual Consumption (AAC), even though the annual estimate for procurement of various items of store was based on AAC calculated from the consumption pattern of the previous three years. DLW stated that as the procurement of materials was mainly based on the Loco Programme, there was no question of over-procurement. The reply was not tenable as the concept of AAC is followed all over the Indian Railways. Moreover, all the items in Stock Master are not directly related to Loco Production and for calculation of overstock as per codal provisions, AAC field was necessary.

* The MMIS applications of SR and DLW and the Pay Roll and Provident Fund Accounting System of NER, did not provide for an audit trail.

* In RCF, only partial data from the old system was migrated into FACT, though FACT was developed with the express purpose of upgrading the earlier system. As a result, the information or processing is limited to this extent. Further, the approval of competent authority to accept and

implement the software in an online environment was not obtained. Serious bugs were detected after the software became operational as brought out in subsequent paragraphs. RCF accepted the audit contention and stated that this will be taken care of during system development in future.

∗ Even after a lapse of twelve years of its initial implementation in 1994, SER had implemented only two modules i.e. Patient Registration and Radiology out of the 13 modules of HIMS in its hospitals so far. No target date has been set for implementation of other modules.

Recommendations

Railways should ensure that users are involved at the development stage and the applications developed address all operational requirements. Railways may formulate standard guidelines addressing the aspects that should be taken into consideration for systems development in line with the standard IT practices. Where applications are allowed to be developed locally, it should be ensured that they are comprehensive and are implemented within a specified timeframe.

2.8 Deficient general controls

General controls regulate the environment to administer and implement the range of applications run on computers. General controls include the IT security policy, change management controls, disaster recovery plans and environmental controls. It was observed that:

∗ The IT security was weak and both physical access and logical access controls were inadequate. Organisational and management controls were weak and proper segregation of duties was not ensured, enabling assistant programmers to access live data, which was fraught with risk.

∗ There was no system of documenting change requests and the changes carried out, which was further complicated by the absence of an audit trail.

∗ There was no business continuity plan. The back-ups were neither tested regularly nor stored off-site.

∗ Railways did not have an environment policy to dispose of e-waste and the obsolete or unusable computer hardware were disposed off like any other ordinary scrap, posing grave environmental and health hazards.

2.8.1 Inadequate IT security policy and safeguards

Information Systems security policy relates to safeguarding valuable assets/data against threats, loss, misuse, unauthorised disclosure or damage. The IT security policy encompasses both physical and logical access issues. Organisational and management controls provide for proper and clearly defined levels of responsibility by adequate separation of duties within the information processing environment. It was observed that:

∗ A documented security policy had not been framed and circulated among the users of MMIS on SR and the Payroll and Provident Fund Accounting System of NER. Neither was any training provided to the users.

* For proper physical security, the server as well as the terminals used by the administrators should be physically separated from the other terminals. In the depots of SR, the server and the operator terminals were located in the same cabin, thus, impinging on physical access and security. So was the case with Lucknow division of NER, where the server and console operator terminals were in the same cabin. On SER, patient registration by the HIMS was carried out in the EDP room, thereby giving access to outsiders.

* On SR, all the workstations having access to the server had both floppy disk and CD ROM drives. These had not been disabled, thereby increasing the risk of bypassing access control software and unauthorised access to the server.

* There was no system of maintaining emergency passwords for use in unforeseen situations and controls were not adequate to identify the users uniquely, to change passwords periodically and to limit the number of invalid password attempts. On SR and SER, the system was not deactivated automatically even after repeated unsuccessful attempts by unauthorised users, thereby increasing the risk of hacking. On both DLW and SER, there was no laid down password policy for gaining access to the application, databases and operating system. User identifications and passwords were being shared by multiple users to access all financial data and system software rendering the system vulnerable to unauthorised access. On NER, data entry operators did not have passwords and were allowed unrestricted access.

* In the absence of proper segregation of duties, the same user (Assistant Programmer) in RCF had access to the live application environment and performed various activities such as analysis of change requirement/request, development/coding work, testing, releasing of software including amendments to the live data. RCF in reply (November 2006) stated that the staffing pattern of IT Department comprised mainly of officers and assistant programmers and all the development and maintenance assignments were performed by the Assistant Programmers under proper supervision. The reply was not tenable since providing the Assistant Programmers with access to live environment and permission to make changes to live data was fraught with risk and was a significant control weakness. In DLW and SER too, there was no clear segregation of duties and the roles of programmers and data entry operators was interchangeable.

* In DLW, no system was in vogue to protect the data during transmission from Wards to the EDP section as well as from EDP to the Kolkata office. Protocol analysers[3], data transmission in encrypt[4] form, essential for network security were not being used, thus, exposing the network to risk of

---

[3] **Protocol analyser: is computer software or hardware that can intercept and log traffic passing over a digital network or part of a network**

[4] **Encryption is a process of converting a plain text message into a secure coded form of text for protecting data in transit over network from unauthorised interception, manipulation, or alteration of data.**

access by unauthorised users, DLW agreed to implement the web server security.

Recommendation

Railways need to strengthen the security of the IT systems, particularly the access to the systems comprising both physical access as well as logical access, with a clear password policy, user id management and segregation of duties.

2.8.2   Lack of change management controls

A good system needs to provide for changes in a well defined manner. The change needs to be documented, approved by the appropriate levels, thoroughly tested and then stabilised.

No record was maintained either of the change requests or of the changes carried out, which was further complicated by the absence of an audit trail. In the absence of documentation/evidence, it was not clear whether the changes made were appropriate and were duly authorised thereby exposing the systems to risk (SR, DLW and RCF). In RCF, there was no documented procedure for effecting changes in the software, though ISO 9001 certification on quality assurance for the IT department had been obtained. In a majority of cases, changes in the application software were without user approvals. Delays in effecting changes were also noticed. For instance, the new pension scheme introduced from 1 January 2004 was given effect to only from April 2005 in the software at RCF.

RCF, in reply, stated that a committee for change management has been formed and its recommendations would be implemented after acceptance by the competent authority. However, the procedures for change management need to form part of the initial planning itself and cannot be introduced in an ad hoc manner.

Recommendations

The procedures for carrying out changes in system environment and steps to be taken in case of disruption of processing should be laid down clearly to ensure minimal effect on the business of the Railways in line with the importance of the applications. The application specific policy needs to be dovetailed with the organisational policy in each critical area.

2.8.3   Lack of business continuity and disaster recovery plans

A disaster recovery plan is vital for an organisation to cope with the loss of operational capability due to unforeseen contingencies and to safeguard the IT assets from other disruptions. It is also essential that the disaster recovery tools should be constantly tested and updated.

On any of the Railways reviewed, there was no business continuity plan and the back-ups were not tested regularly. The back-ups were also not stored off-site. On SR and SER, the back up data was stored in the same room housing the Information Processing Facility (IPF). Even such basic precautions such as timely refilling of fire extinguishers, had not been carried out. The systems were, therefore, exposed to the risk of serious threat in the event of a disaster (SR and DLW).

Recommendations

Railways need to draw a structured business continuity and disaster recovery plan with off-site back up sites for business continuity as well as data storage. A procedure needs to be prescribed for obtaining back up regularly as well as testing the stored data.

2.8.4   Lack of e-waste disposal policy

Discarded computer hardware and other non-biodegradable electronic devices with used carbon papers are being seen as new threats to the environment as they contain highly toxic chemicals like, lead, zinc and chromium besides glass, plastic and heavy metals.

Railways did not have an environment policy to dispose off e-waste and the obsolete or unusable computer hardware were disposed off like any other ordinary scrap, posing grave environmental and health hazards. For an organisation the size of the Railways, it is essential to lay down norms and procedures for dealing with the e-waste generated.

Recommendation

A policy for disposal of e-waste in line with international practices needs to be defined urgently in view of the quantum of e-waste generated by the Railways.

2.9   Deficient application controls

Application controls relate to the specific tasks performed by the system and comprise input, processing and output controls. Application controls are designed to provide an assurance that the inputs are properly authorised and complete, validating checks are in place, processing was done as designed and that the outputs are accurate. Application controls should also take into account the extant rules governing the subject.

It was observed that the applications reviewed had inherent deficiencies and the processing of data was inconsistent with extant rules. The databases contained various incompatible data severely compromising confidentiality, integrity and availability of data and rendering them unreliable as detailed below.

2.9.1   Deficient Payroll and Provident Fund Accounting System

The application implemented by NER on Lucknow and Varanasi divisions had inherent deficiencies, particularly input controls and the transactions processed were inconsistent with extant rules. As a result, salary and allowances were drawn beyond entitlements, recoveries were improperly affected and advances were incorrectly regulated, adversely affecting the integrity of the system. The application also accepted incomplete/incorrect data in various important fields. Consequently, the risk of reliance on the system was high.

2.9.1.1 Salary

At Lucknow, 628 employees were allowed leave salary to the tune of Rs.0.21 crore, despite there being minus balances in their leave accounts. Similarly, salaries were drawn for the months of May 2005 and February 2006 for the staff who had retired in April 2005 and January 2006 respectively in Varanasi and Lucknow divisions. This indicated that master data was not updated promptly, exposing the application to the risk of overpayment. The

application also allowed drawal of basic pay in excess of the permissible limits at Varanasi.

2.9.1.2 Allowances

Various allowances payable to officials were improperly drawn as brought out below:

∗ As per rules, any employee on leave or on duty outside his/ her headquarters for a period of more than thirty days at a stretch was not entitled to transport allowance. In Varanasi and Lucknow, the above provision was not built into the application and transport allowance was paid to six employees who were on leave for more than 30 days at a stretch.

∗ Non-practicing allowance (NPA) was payable to doctors @ 25 per cent of basic pay with certain conditions. Data analysis for June 2006 revealed that 18 ineligible employees were included in the list of eligible officials. Hence, NPA, which should have been payable to doctors only, was being allowed by the system to non-eligible staff as well.

∗ Dearness pay was drawn in excess of the admissible limits for 25 employees in Varanasi.

∗ House Rent Allowance was allowed by the system to transferred employees beyond the admissible period of eight months prescribed for retention of quarters.

∗ Though overtime allowance was permissible only for specific categories of staff, the system accepted payment of such allowance for all employees without checking the eligibility criteria. Input controls in the system were found to be deficient.

2.9.1.3 Recoveries

The application also incorrectly regulated various recoveries as detailed below:

∗ Rent and water charges for quarters were to be recovered at prescribed rates from staff in occupation of government accommodation. The rent was not deducted in the month of July 2006 for seven officials in Varanasi and 40 officials in Lucknow, even though the dates of occupation of quarters and the respective codes were assigned against them in the master data. Similarly, water charges were not deducted in respect of 36 officials in Varanasi and 4,213 officials in Lucknow. Moreover, rent was wrongly recovered from two employees in Lucknow, who had vacated their quarters.

∗ As per rules, subscription to Provident Fund (PF) was recoverable at a mandatory minimum rate of 8.33 per cent of Pay (Basic plus Dearness Pay) and the maximum recovery should not exceed the amount of Pay including VPF. The recovery of PF subscription was less than the prescribed minimum in 21 cases at Lucknow. Subscription to PF including VPF exceeded the basic pay plus dearness pay in contravention of provisions in one case in Varanasi and 11 cases in Lucknow. Further, subscription towards PF was not deducted at all for 28 and 139 employees,

who had completed the minimum one year of service in Varanasi and Lucknow respectively.

∗ Compulsory deduction towards CGEIS was not affected from four employees in Varanasi, even after completion of the requisite one year of service.

2.9.1.4 Advances

The application improperly regulated drawal of various recoverable advances and the recoveries were also incorrectly affected as shown below:

∗ As per rules, Festival Advance of Rs.1,500 was admissible once in a calendar year to non-gazetted employees with basic pay not exceeding Rs.8,300 per month and was recoverable in a maximum of ten equal instalments, commencing from the month in which the advance was made**.** However, it was observed that Festival Advance was granted to three employees in Varanasi and nine employees in Lucknow, whose basic pay had exceeded the permissible limits. NER's contention that provisions were built into the application to restrict drawal of advances as per rules was not tenable as the same was not found working in the above cases**.** The application also permitted payment of Festival Advance to five employees of Lucknow twice in a month (February 2006) and in three cases one extra instalment of Festival advance was recovered in Lucknow**.**

∗ Scooter advance on the first occasion was payable up to a maximum of six times the basic pay of the employee limited to Rs.30,000. Data analysis, however, indicated that in four cases in Varanasi, scooter advance was sanctioned in excess of the permissible limits.

∗ House Building Advance was short recovered from seven employees in Lucknow, due to incorrect data entry of number of instalments.

2.9.1.5 Incomplete data

Analysis of databases, both at Varanasi and Lucknow, revealed that in the absence of adequate input controls, the system accepted incorrect/incomplete data in various important fields such as date of birth, date of appointment, date of increment etc, thus, adversely affecting the data integrity and reliability. In the absence of basic data such as date of appointment, date of increment, the utility value of the pay roll system becomes highly circumscribed and management would have to fall back heavily on the manual system to avoid incorrect payments. The risk of fraud was very high in the system in view of the poor application controls.

2.9.2   Deficient Material Management Information System

Application controls in the MMIS applications adopted by SR and the one developed by DLW were weak. Priced ledger numbers were improperly allotted, check digits were incorrectly assigned and the master tables contained several inconsistencies. The applications also allowed incorrect data entry and did not provide for either checks or alerts to highlight these mistakes. As a result, the utility value of the information that could be derived from these applications was limited.

2.9.2.1 Non-allotment of uniform Priced Ledger Number

For exchange of information on stock position between zonal railways/ production units, Railway Board had decided to implement a standardised system for allotment of uniform Priced Ledger (PL) numbers, consisting of eight digits over Indian Railways. In fact, the rationale for a uniform inventory management system across the Indian Railways is provided by having common PL numbers, which would enable management control of inventory at the Board level.

A comparison of databases of SR and DLW disclosed that the policy of allotment of uniform PL numbers to the stock items was not followed and 166 items, valuing Rs.0.47 crore had different PL numbers, though the description of the stock items were identical. Analysis of individual databases also revealed that the deficiency existed even within the individual railways and different PL numbers were found for identical items in 573 cases (valuing Rs.1.53 crore) in SR and in 4,868 cases valuing Rs.49.56 crore in DLW.

Additionally, zonal railways/ production units were permitted to allot code numbers under 'sub-group 98' for items peculiar to that individual railway/ production unit on a temporary basis and then refer the matter immediately to the nominated Railway for a permanent number. Thus, these PL numbers should have been operated at best for very short periods of time. Analysis, however, disclosed that 4,208 stock items in SR and 1,041 items in DLW were operated with temporary PL headings under this sub-group for a period of upto 20 years.

In DLW, 11 stock items having alpha numeric PL numbers were found in master files, though the Railway Board as far back as in 1966 had adopted the system of assigning an eight digit numeric code to stock items. DLW agreed to rectify the deficiency.

The operation of different PL numbers for similar items within a zone and across zones as well as the operation of temporary PL numbers for abnormally long periods has, thus, vitiated the very concept of a standardised system and exchange of information across zones. The application developed should have checks to prevent such duplications or, at the very least, alert the management to these deficiencies.

2.9.2.2 Deficiencies in master files and in processing

Analysis of the databases in SR and DLW indicated various deficiencies as brought out below:

* In DLW, 2,870 cases did not figure in the stock master file and 17 cases did not figure in the item master file.

* The closing balance, which is the product of quantity and the book rate, was incorrectly calculated in the stock master. Closing balance was understated by Rs.0.19 crore (2,285 items) and Rs.14.60 crore (5,962 items) and overstated by Rs.4.71 lakh (2,182 items) and Rs.5.06 crores (5,120 items) respectively in SR and DLW. In DLW, the stock was issued at rates higher than the book average rate in respect of 30,419 items to the tune of Rs.65.02 crore, which, inter-alia, resulted in overcharging of consumption and increasing the cost of the product.

∗ The book value of various stock items was either zero or negative, both in SR and DLW though the quantity balance was more than zero. Conversely, in DLW, where the quantity balance was zero, in 1,726 cases (valued Rs.2.82 crore) the opening value was positive and in 1,747 cases (valued 1.21 crore) closing value was positive.

∗ Dates of receipts and issues were not mentioned in 1,047 cases (valued Rs.1.13 crore) and in 210 cases (valued Rs.0.75 crore) respectively. In 114 cases (valued Rs.0.12 crore), both the date fields were left blank. In the absence of this information, categorisation of stores as moving and non-moving was not possible (SR).

∗ The vendor data bases were also defective to the extent that it contained names of vendors, who had defaulted earlier. These names were neither removed nor flagged to indicate the status with the danger of repeating orders on them. More than one vendor code was allotted to the same vendor. On SR, there were five vendor codes, without any other details. In 14 cases different vendor codes were assigned to same vendor and in 34 cases address of the vendors was left blank. Records in three fields, 'Specification' (15,061 records), 'Description' (13 records) and 'Short description' (four records) were left blank (DLW). Purchase orders were also placed on vendors who were not listed in the vendor master.

∗ The tender file did not correctly depict the date fields. Analysis of data for the period from January 2001 to February 2006 revealed that in 22,350 cases, time taken for finalisation of the cases was in the range of (-) 384 days to 695 days, indicating that the dates mentioned in the respective fields were incorrect (DLW).

∗ In the case of 9,884 stock items, dates of opening were different in two master files (DLW).

∗ Further, an analysis of the database in DLW revealed invalid data in the fields of 'Open Date' in 9,331 cases, 'Demand date' field in 157 cases and 'Tender No' in 10 cases .

∗ An analysis of the purchase procedure transaction file in DLW also revealed inconsistencies in processing. In 76 cases, the demand date for material was shown as succeeding the date of registration (Case date). Similarly, case registration date in 1,042 cases was subsequent to quotation date. In 2,297 cases, the tender date was after the quotation valid date. In 200 cases having a tender value of Rs.46.70 crore, the tender date was after the tender decided date. The vetted date was before the 'Material List Date' in 4,769 cases. Further, in 4,033 cases, demand quantity in 'Demand file' was not equal to demand quantity of Case file. The purchase order quantity also exceeded the quantity demanded in 3,297 cases. Purchase orders valued Rs.3,230.07 crore were placed on vendors having no Income Tax clearance certificate in 29,051 cases.

2.9.3 Deficient Financial Accounting System

The FACT developed by RCF also had several deficiencies and transactions processed were not consistent with extant rules. Deficiencies existed in

Provident Fund, Loans and Advance, Stores and Bill passing/budget modules, casting doubts on data integrity as brought out below:

2.9.3.1 Deficiencies in Provident Fund module

An analysis of the module designed to maintain the Provident Fund (PF) accounts of employees in accordance with rules revealed a number of discrepancies in contravention of extant rules.

∗ Interest of Rs.5.83 lakh was credited beyond the permissible six months period to the accounts of employees, who had already left the organisation.

∗ An amount of Rs.0.15 crore received from Railway Board towards payment of interest to officials was credited to a fictitious employee *id* number 'TRAIL1'.

∗ Subscription towards provident fund during the year 2005 was recovered in excess of the permissible limit by Rs.68,756 in 10 cases.

∗ Opening balances of PF accounts of 35 employees were found to be negative.

RCF stated that the deficiencies had been rectified and that necessary checks had since been incorporated in the application to prevent recurrence. However, the presence of these discrepancies in the application in the first place indicates that the logic built into the system was defective and there was inadequate testing before operation of the application.

2.9.3.2 Deficiencies in Loans and Advances module

This module was designed to maintain the accounts of financial transactions pertaining to different loans and advances viz. House Building Advance, Scooter Advance, Car Advance, Festival Advance, Cycle Advance etc. sanctioned to officials of different cadres. It was observed that:

∗ The loan accounts were not maintained properly and blanks were found in the sanctioned amount field in 75 cases and 'amount released' field was left blank in 82 cases. Moreover, in 23 cases the principal balances were found negative. In eight cases, the amount recovered was more than amount released. Ledger balances were also not updated instantly. In reply, RCF stated that the cases pertained to transferred employees and the matter was being pursued for carrying out corrections.

∗ The balance amount recoverable as shown in the master table did not tally with the transaction details in 239 cases.

∗ In four cases, recovery of principal amount continued beyond the prescribed maximum of 180 months from the date of sanction of loan and, in four other cases, the amount of loan released was greater than loan sanctioned.

∗ In 31 cases, the interest recovered for each transaction did not tally with the difference between interest amount calculated and interest amount still due to be recovered with the difference ranging from as much as Rs.(-) 96,901 (negative) to Rs.5,237. RCF in reply stated that about 20 cases had been corrected and remaining were being checked.

∗   In 46 cases, recovery towards different loans commenced only after expiry of 25 to 60 months from the date of release of the loan. In nine other cases, recovery was shown as having commenced 30 days earlier than the date of release of loan and the system did not prevent such obviously incorrect data input.

2.9.3.3 Deficiencies in Stores module

The Stores module was designed to maintain the accountal of various stores transactions including payment of stores procured. Data related to stores procurements was not reflected properly as brought out below:

∗   The purchase order value did not tally with the payments made with variations of over 100 per cent in 40 purchase orders. In one purchase order, though the payment made was Rs.16.59 crore, the purchase order value was incorrectly recorded as Rupee one. The RCF in reply stated that earlier, all the amendments that affected the purchase order value were issued manually and, therefore, the value was not updated in the system automatically. Now, amendments were issued through the system and purchase order value was updated automatically. However, this points to incorrect adoption of logic during system development.

∗   The system indicated positive opening quantity balance with zero value in respect of two items. Similarly, in respect of five items, opening quantity balance was zero though their value recorded was Rs.0.16 crore. In four contracts, payments made were more than the contract value.

2.9.3.4 Deficiencies in Bill passing/Budget module

This module had the following deficiencies:

∗   In 44 cases, bill passing date was prior to bill receipt date.

∗   In 512 records, though codes were allotted to different parties, their addresses were not recorded. Similarly, in 59 records, the address in the Bank Master Data was recorded as 'A'.

∗   Primary units[5] were not assigned to each allocation code in contravention to the codal provision[6]. Similarly, database also contained invalid allocations.

RCF, in their reply, stated that remedial action would be taken and that proper checks incorporated in the system to prevent recurrence of the deficiencies pointed out.

2.9.4   Deficient Freight and Passenger Accounting System

The application developed by WR for accounting freight and passenger earnings and for correct and prompt apportionment of originating earnings to other railways had become redundant with the Railway Board decision in June 2006 that the passenger earnings and freight earnings should be accounted by PRS, UTS and FOIS. WR, however, continued to use the application, which had various deficiencies. The non-incorporation of relevant rules governing

---

[5] Primary Unit**:** Last 2 digits of each allocation assigned to indicate object of expenditure.

[6] As per Indian Railways Financial code Vol_II, each allocation should have a PU (Appendix-II) (Para701 Financial code Vol -I).

the apportionment of earnings into the application resulted in incorrect apportionment of earnings to zonal railways as shown below:

∗ Unmatched earnings are distributed to respective zonal railways on the percentage fixed for apportionment of earnings on kilometer basis. A review of the earnings of PRS, PCT[7] and SPTMs[8] for the months of July 2005 to March 2006 revealed that the unmatched earnings of Rs.38.06 crore were not apportioned by the system as per kilometers travelled, for want of pairs of stations available in the Master file. This was because the pairs of stations in the master file were not updated periodically. The failure to update even master tables on which the system relies so heavily would result in deficiencies in data reliability and integrity.

∗ Amount collected on bills raised against Military, Police and other departments for booking of tickets on vouchers were not included in the total earnings for the purpose of apportionment. The total amount collected from Military, Police and other departments and included in the earnings of WR without being apportioned to other railways was Rs.33.30 crore for the period 2005-06, resulting in overstatement of the earnings of WR.

∗ Apportionment Master File contained redundant data, such as same station with different station codes (2,120 records) or same station code for different stations (2,255 records). A large number of fields were left blank in 8,227 records. The Apportionment Master File was also not updated periodically. Thus, the risk of incorrect apportionment of earnings amongst the zonal railways was high defeating the purpose of the application.

∗ The application included the safety surcharges in total earnings, in contravention of extant rules. For the year 2005-06 alone, earnings of WR were overstated by Rs.44.61 crore.

2.9.5 Deficient Hospital Information Management System

An analysis of the database revealed that the data captured in the system developed by SER was incorrect and incomplete rendering the system unreliable as given below:

∗ The system accepted future dates as well as dates prior to date of birth of the patient as the date of registration, due to lack of proper validation checks by the system.

∗ Mandatory fields like patients' date of birth, Bill unit, Department, patient relationship with the beneficiary were found blank.

∗ The system accepted patient registration details of retired employees, without their respective retired card numbers and validation of the medical cards.

∗ The schedule of charges laid down for outsiders for treatment (specialised, indoor and for all investigations) such as private servants of Railway employees and families of quasi railway employees was not incorporated in the system exposing the system to incorrect recovery of such charges.

---

[7] **Printed Card Ticket**
[8] **Self Printing Ticket Machine**

∗ The input and output controls were also weak and the reports generated did not reflect the correct position. For instance, the monthly consumption report of the radiology department generated by the system did not match the actual consumption possibly, due to errors in the opening balances.

Thus, all the applications reviewed showed incorrect adoption of logic, resulting in errors which render reliability and integrity of data doubtful. These errors could have been avoided had the Railways carried out adequate trials and testing of the applications before incorporation in a live environment.

Recommendations

Railways should strengthen its existing validation checks in the computerised systems and build in additional checks so that the deficiencies and inconsistencies pointed out in the systems are eliminated and data integrity is enhanced. All the relevant rules and codal provisions should be incorporated in the applications to achieve compliance with rules. All applications need to go through systematic field trials before being made operational in live environment.

2.10 Sub-optimal utilisation of applications

In spite of having computerised applications all the features of the applications were not being optimally exploited as brought out below:

∗ The MMIS applications in SR and DLW were not optimally utilised to achieve the objectives of material management. Stores were procured in excess of requirements and inventories were held beyond the prescribed norms. In DLW, analysis of database revealed overstocking of 7,173 items beyond permissible limits to the extent of Rs.59.84 crore. Similarly, in SR, 569 items valuing Rs.0.74 crore had been kept in excess of fifty percent of previous year's consumption. Further, departmental stock verification was not carried out in DLW. Further, analysis of the Stock Master in DLW disclosed that 32 Category 'A' items were out of stock of which, 22 items had balance value zero or less than zero. Evidently, planning for procurement of 'A' category items had not been done properly.

∗ Turnover ratio expressed as a percentage of value of physical closing balance to the value of issues during the year is used to measure the efficiency of inventory management. As against the prescribed target of 20 per cent fixed by Railway Board for DLW, the ratio continued to be higher up to January 2006 (42 per cent). Disproportionately high issues were recorded towards the end of the year in March 2006, without physical movement of materials, to achieve the prescribed targets.

∗ Despite requisite data being available in FACT application of RCF for generation of managerial statements, these were being prepared manually.

∗ Though the patient registration module of the HIMS provides for nearly fourteen reports, not a single one was being generated from this module.

Recommendations

Railways should ensure optimum utilisation of the applications by exploiting all their features in order to achieve their objectives.

2.11 Conclusion

The IT strategy on the Indian Railways was not comprehensive or in line with standardisation goals. As a result, applications were not being developed and implemented on the zonal railways in a systematic manner. Local applications developed in zonal railways overlapped with the proposed standardised applications. Further, these, as well as the stand alone applications, were operated in poor control environments. The inadequacies of controls adversely affected the confidentiality, availability and integrity of data and the associated risks were high. This is also borne out by the sub-optimal utilisation of the applications.

(KANWAL NATH)

New Delhi   **Deputy Comptroller and Auditor General**

Dated:

Countersigned

(VIJAYENDRA N. KAUL)

New Delhi   **Comptroller and Auditor General of India**

Dated: