

## Chapter II

### Information Technology Audit of the Directorate of Education

#### Highlights

**The application development process, planning, security and testing were poorly managed.**

*(Paragraphs 2.7.1)*

**Feasibility study was not conducted.**

*(Paragraphs 2.7.2)*

**Audit trail was not incorporated in the application.**

*(Paragraphs 2.7.3)*

**Input controls were inadequate and issues relating to authorisation were not adequately addressed. This resulted in incompleteness of the database.**

*(Paragraphs 2.8.1, 2.8.3-2.8.5)*

**Inadequacy of the implementation of the business rules resulted in irregular payments.**

*(Paragraphs 2.8.1)*

#### 2.1 Introduction

The Directorate of Education, Government of National Capital Territory of Delhi is primarily responsible for providing education up to Senior Secondary level in NCT of Delhi. The computerisation of the Directorate was conceptualised way back in 1983<sup>1</sup> but the work could only be started three years later in September 1986<sup>2</sup>. The Directorate got developed six Applications from 1986 to 2002 viz. (i) Personnel Information System for Teachers, (ii) Management Information System of Ministerial Staff, (iii) Payroll for Headquarters Office, (iv) Post Fixation, (v) Management Information System on Employees, and (vi) Management Information System on School Infrastructure. Item (i) and (vi) were developed at a cost of Rs. 2.61 lakh. Item (ii) to (v) were developed by National Institute of

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<sup>1</sup> In a meeting in the chamber of Secretary (Planning) in October 1983, an MIS for administrative activities for the Directorate of Education was proposed.

<sup>2</sup> In September 1986, CMC Limited was assigned the development work of Personnel Information System of teachers which could not take off due to administrative reasons.

Educational Planning and Administration (NIEPA) free of cost. The approach of the Directorate towards computerisation was ad hoc, as these applications could not be stabilised, and of these, three (i, ii and v) were for the same purpose.

The Management Information System (MIS) in present use is a web based computerised system which was approved in 2002-03. As a result a web based MIS was evolved. The MIS was conceptualised as an online, menu driven software, capable of carrying out various functions of the Directorate. The development started with a simple Employee Module and was gradually enlarged to include other Modules. Presently there are 26 Modules and Sub-Modules in different stages of operation<sup>3</sup>. The software has been developed with ASP .NET (DOT NET) as its front end and SQL Server as the back end. The data is stored on the server of NIC and is available to all authorised users through the website. The Directorate has established connectivity with all of its formations through web based system. The objective of MIS is to facilitate online (i) transfer/ posting/ relieving/ joining of employees, (ii) management and monitoring of finance, payroll, leave cases, (iii) monitoring student activities viz health, academic achievements etc, and (iv) management of school inspections. Four important modules of the applications, which are critical for the working of the MIS and require interfacing are:

- \* Payroll
  - Facilitate online data entry for employees' salary related information.
- \* Personnel
  - Facilitate online data entry for employees' personal information viz. name, date of birth, appointment etc.
- \* Finance
  - Facilitate online issue of sanctions.
- \* Attendance
  - Facilitate online data entry for employees' attendance and leave related information.

In practice, however the software has not reduced paper work. All manual cases are being generated through MIS.

## **2.2 Organisational set up**

The Directorate of Education is headed by a Director who is assisted by Additional Directors, Joint Directors and Deputy Directors. The Directorate has twelve districts, four Regional Offices and 28 Zonal Offices etc. The IT wing of

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<sup>3</sup> Out of 26 Modules and Sub Modules, 22 are operational, two are non-operational and two are partially operational.

the Directorate is headed by Additional Director (IT) who is assisted by two Office Superintendents and one Assistant Programming Officer (APO) and a Data Entry Operator (DEO). APO is the highest technical person in the Directorate and is responsible for all quality assurance, logical & physical security and supervision.

### **2.3 Audit Scope**

MIS had been implemented starting with a simple Employee Module at the beginning in 2002-03 and gradually extended to 26 modules and sub modules implemented at different points of time. Audit evaluation of the performance of the system was conducted for the years 2002-03 to 2005-06. MIS was having 46218 users from 927 Schools, 12 Districts, four Regional Offices, 28 Zonal Offices and the Directorate. For verification of errors noticed in audit from the database supplied by the Directorate, 50 schools were randomly selected out of the 927 schools.

### **2.4 Audit Objectives**

The IT audit of the Directorate of Education was conducted to assess whether:

- i) The implementation of the system was preceded by a systematic planning and adequate assessment of operational requirements and needs.
- ii) The system documentation was adequate and updated to ensure efficient and continuous operation of the system.
- iii) Data generated was complete, reliable and conforms to the rules, procedures etc. of the government.
- iv) The physical and logical access controls were sufficient to guard against unauthorised access and modification.
- v) The modules were delivering what was expected.

### **2.5 Audit Criteria**

The following audit criteria were used to ascertain whether the objectives stated above were being achieved:

- \* I.T. strategy of the Directorate.

- \* The rules and regulations of the government.
- \* Generally accepted IT best practices.

## **2.6 Audit Methodology**

The audit of the MIS was conducted considering the benchmarks and guidelines adopted by the Comptroller and Auditor General of India for conducting Information Technology Audits. The data analysis was done using IDEA Software.

## **2.7 Application Development Process**

### **2.7.1 IT Planning**

In order to achieve the desired objectives there should be a proper 'Information Technology Strategy' and well defined IT Plan.

However it was noticed that during the development of the systems in the Directorate no such system development methodology was planned and followed. The Directorate incurred a total expenditure of Rs.1.37 crore during 1986-2002<sup>4</sup> on computerization. During this period development of six applications were taken up through various projects (of these three were for the same purpose), which could not be implemented fully, indicating lack of clearly defined goals for achievement through computerisation. Also the Directorate did not document the User Requirement Specifications (URS). There was no documented testing plan and results were not available in respect of various types of tests stated to be conducted. Further, Change control procedures were not authorised, approved, and documented.

It was also noticed that the Directorate lacked a well-defined and documented password policy. It had not developed a documented 'Disaster Recovery & Business Continuity Plan'. In April 2005, the server had crashed and resumed after 4 hours. It took approximately one and a half days for re-entry of the lost data pertaining to 'Pay Roll Module'.

The present MIS system's back end (data base server) was located in NIC's Headquarters. The database server used was SQL, with front end in .NET, in two-tier architecture. The use of two-tier architecture meant that only way of making

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<sup>4</sup> From 1986-2002 the expenditure on hardware was Rs.71.34 lakh, on software was Rs. 62.23 lakh and other was Rs. 3.66 lakh (excluding the expenditure on training). The year-wise details are given in Annexure 'A'.

the system available to the users in remote locations was by having dedicated communication links. Implementation of MIS required certain prerequisites which were stabilisation of network connectivity, hiring of IT Assistants and training of personnel. Problems of dedicated connectivity have meant that a large number of users on the WAN lead to an over-burdened server and degraded performance. The dependence of MIS on network connectivity had affected its implementation and use as the system was not fully available to users. All locations experienced the server's becoming non-responsive or time-out.

### ***2.7.2 Absence of Feasibility Study***

Audit scrutiny revealed that NIC conducted a technical feasibility study in 2000-01 for the computerisation of various functions of the Directorate. The Directorate initially accepted the report but later on went ahead with implementation of its own in-house developed MIS linking all schools, districts, zonal offices and the Directorate without conducting any technical feasibility study. Non-carrying out of technical feasibility study of MIS system resulted in improper development of application systems. The hardware was not in a position to tackle huge network traffic, which resulted in server's becoming non-responsive several times and thereby adversely affecting the availability.

### ***2.7.3 Audit Trail***

Adequate 'Audit Trails' are required to be incorporated in the IT System for detecting security violations and tracing the flow of transactions in a timely manner. Scrutiny revealed that there was no provision to log the date & time and details of users feeding/modifying data etc. The Directorate stated that it did not intend to increase the server load as the server was unable to support its system optimally.

## **2.8 Evaluation of Application and Data Analysis**

### ***2.8.1 Payroll Module***

The purpose of the payroll module was to facilitate online data entry for employees' salary related information and generation of pay bills, pay slips and recovery schedules etc. Audit scrutiny of the module revealed following shortcomings:

***Input controls and validation checks:*** Data in schools was being entered by IT Assistants hired through a private company using the user Id and password of

the Directorate officers. The entries made into the system were to be validated by the Drawing and Disbursing Officer. However, it was noticed that the process was not controlled and monitored by him adequately to ensure that data entry was done by authorised person. Due to data entry by third party without further authorisations various aspects of security and authorization were weak.

Audit scrutiny also revealed that input controls were inadequate. Data analysis revealed that

- Specific details of disability in respect of handicapped employees were not found recorded in 46 cases.
- In 30 cases the sanctioned date of GPF advance was not recorded.
- In seven cases, total amount of GPF advance recovered was shown more than the sanctioned amount. In 20 cases, the total number of monthly installments was more than the maximum prescribed limit of 36 installments. In 814 cases, the sanctioned date of advance was recorded as 01-01-1900, which was unrealistic. In 10 cases, sanctioned date was a future date (beyond the backup date of 13-07-2006) instead of past.
- Out of 7,135 loan cases, in 276 cases the loan amount was recorded more than sanctioned loan amount; in 982 cases the sanctioned date was unrealistic; in 29 cases, loan sanctioned date was a future date instead of past.
- Out of 207 cases of HBA, in three cases, the recovered principal amount was shown more than sanctioned amount. In 80 cases, recovery of loan had not started even after 2 years of sanction/disbursement.
- Out of 517 cases of vehicle advance (MCA), in 112 cases principal amount recovered was shown as zero while interest was shown as being recovered; in 10 cases, both principal and interest amount recovered were shown as zero; in seven cases, principal amount recovered was more than the sanctioned amount.
- Out of 882 cases of festival advance (FA) shown disbursed up to October 2005, recovery in 15 cases required to be started from next month had not started even after expiry of nine or more months. In 35 cases, amount recovered was more than the sanctioned amount.
- Festival advance was granted irregularly to 34 ineligible employees whose total pay (Basic + DP) exceeded Rs. 8300/- per month. Further verification at selected schools revealed that in one case recovery of transport allowance was wrongly booked under festival advance.

- ✎ Cases of 5,096 employees were appearing two or more times during the same month resulting in 13,137 duplicate cases for the same month and year. Test check of selected schools revealed that no double payment was made. The duplicate entries in the database indicated absence of internal controls as well as input controls.

The absence of input controls and validation checks led to unreliable and inconsistent database necessitating manual intervention for calculation of interest and implementation of business rules thus resulting in duplication of efforts.

**Implementation of business rules:** Business rules describe the operations, definitions and constraints that apply to an organisation in achieving its goals. A test check of MIS revealed that business rules implemented were inadequate which resulted in irregular payments and data errors as detailed below:

- ✎ In 2,202 cases involving 1839 employees, transport allowance amounting to Rs.4.33 lakh was shown as paid for the months when the details of the attendance for complete calendar month of the officials concerned were not available in the system. Test check of cases for selected schools revealed that out of 27 cases, in 23 cases transport allowance was paid to ineligible employees who did not attend office during the month. Thus in 23 cases it was required to be recovered.
- ✎ In 273 cases, as per database, relating to 58 physically handicapped employees the payment of Transport Allowance at enhanced rate could not be verified in audit as it was not being paid at the prescribed rate. It was also noticed that in three cases related to two employees who were deaf and mute had been wrongly paid transport allowance at double the rates instead of ordinary rates.
- ✎ In 1,278 cases, as per database, involving 781 employees dearness pay (DP) was not paid at the prescribed rate of 50 percent of Basic Pay. Test check of seven cases for selected schools revealed that in three cases, DP was paid incorrectly.
- ✎ Dearness allowance (DA) was increased from 21 percent to 24 percent w.e.f. January 2006. In 1,749 out of 219494 cases, DA was shown as paid at different rates ranging between five percent and 67 percent. Test check of five cases for selected schools revealed that in three cases incorrect DA was paid.
- ✎ In 1,962 cases, house rent allowance (HRA) was shown as not paid at the prescribed rate of 30 percent of Basic Pay. Test check of 28 cases for selected schools revealed that in 15 cases HRA was not paid at the prescribed rate.

- In 101 cases, licence fee was shown as being recovered from the employees who were drawing HRA. This indicated implementation of improper logic, as out of licence fee and HRA only one is applicable.
- In 596 cases, CCA was shown as not paid as per the admissible rate, in 292 cases it was being paid at higher rate and in 304 cases it was being paid at lower rate. Test check of cases for selected schools revealed that out of 21, in 19 cases incorrect CCA was paid.

Inadequacy of the implementation of the business rules in application systems resulted in irregular payments. There were cases where over/under payment was made which were later on recovered/ paid.

### **2.8.2 Finance Module**

The Finance Module was the pivot on which the system of linkages worked. Due to various inherent and operational problems, Finance Module had not been able to perform efficiently thus affecting the processing integrity of MIS. In the absence of the linkage with Payroll, Attendance, and Personnel Modules there was no assurance that sanction given by DDO was correct in all respects. This lack of integrity in the system meant that the sanctions could not be validated by the system and needed manual intervention. Further, errors in the Finance Module data were reflected in the Payroll module.

- In 30 cases, GPF advance was shown as recovered in the schedule while no recovery was effected in the pay bill. This indicated non-correlation between GPF schedule and pay bill. Test check of three cases of selected schools revealed that in two cases amount was shown as recovered in the schedule while no recovery was effected in the pay bill. In 13 cases the amount recovered as per schedule was different from that of the pay bill.
- In 12 out of 5,794 cases, sanctioned amount was shown as more than the allotted amount. Test check of one record for the selected schools revealed that sanction issued was for more than the allotted amount.
- In 2,081 out of 13,270 cases total salary bill amount did not match with the sanctioned amount. Test check revealed that bill amount matched with sanctioned amount. This indicated lack of input controls.

### **2.8.3 Attendance Module**

The purpose of the attendance module was to facilitate online data entry for employees' attendance, leave details and generation of related reports. Audit scrutiny of the module revealed following shortcomings:



***Input controls and validation checks:***

- In 76,119 cases involving 13,938 out of 37,263 employees, no attendance was marked for the full calendar month (January to June 2006). This defeated the desired objectives of the module of managing leave cases of the employees.
- Data contains attendance for non-existent dates i.e. 29, 30 and 31 February 2006. Data for non-existent dates shows lack of internal controls and question the validity of the module itself.
- The attendance report could be generated using date option only. The schools were not able to generate report for any day of previous months. A further analysis of the database revealed that there was no option to obtain the report for any of the previous month i.e. the data of the current month was only available to the user.
- A test check of January 2006 attendance report for selected schools revealed that in 801 cases out of 1,109 marked attendance cases (72 per cent), there was delay of an hour or more in submitting the attendance instead of within half an hour of opening of the school as envisaged.
- A further analysis revealed that the cause of error was that the application required dedicated connection with the server which resulted huge traffic and over burden on the network. The hardware was not in a position to tackle such huge network traffic which resulted in server's becoming non responsive several times and thereby adversely affecting the availability.

***2.8.4 Personnel Module***

The purpose of the personnel module was to facilitate online data entry for employees' personal information viz. name, address, payscale, date of increment etc. and generation of related reports. Audit scrutiny of the module revealed following shortcomings:

***Input controls and validation checks:***

- In 38,240 cases out of 51,585 cases, "increment date" field was found left blank. In 35,356 cases, salary field was left blank. In 13,275 cases, scale field was left blank. In 10,866 cases, basic pay field was left blank or zero. In 2,700 cases, "Fathers name" field was left blank. In 1,194 cases, post field was left blank. This prevented the verification of pay fixation or other personal data of an employee and required manual intervention

- In 31 cases, date of appointment was prior to date of birth. In 30 cases, difference between the date of birth and the date of appointment was less than 16 years. In 15 cases the date of birth and date of appointment was same.
- In 2,094 cases, the basic pay was more than the time scale. Test check of 41 cases for selected schools revealed that in 17 cases it was due to change in pay scale on promotion. Absence of such validation checks prevented verification of pay fixation through MIS and required manual intervention.
- In 124 cases two or more employees were having same “name”, “Father’s Name”, and “Date of Birth”. This indicated duplicate entry of same employee with different employee-id.

### **2.8.5 Other Modules**

The other modules which were test checked in audit were File Track Module and Court Module. Audit scrutiny of the modules revealed following shortcomings:

#### ***Input controls:***

***File Track Module:*** The purpose of the file track module was to facilitate online management of file movements. Audit scrutiny of the module revealed following shortcomings:

- In 337 cases out of 31,059 cases, file creation date was left blank. This prevented the Directorate from identifying when a case / file was initiated and resulted in poor management of files.
- In 10 cases, the creation date was 01-01-1900, which was unrealistic. In 17 cases no location Id (meant for the branch that had created the file) was found. This prevented the Directorate to manage file movements through MIS.
- Eight files were given two or more file-ids leading to 25 duplicate cases having same file number.

***Court Module:*** The purpose of the court module was to facilitate online management of court cases. Audit scrutiny of the module revealed following shortcomings:

- In 98 cases out of 188 cases, ‘Judgement Date’ in ‘Judgement Details’ table (meant for recording finalised cases) was left blank.

- In 975 cases out of 1,071 cases, no PID (Para Identification number which indicates notice issuing branch) in 'Parawise Master Track' table (meant for recording various transactions viz. issue of notices etc.) was given.
- In 18 cases out of 2,666 cases, 'Case Number' field in 'Case Master' table was left blank.
- In 2770 cases out of 7,313 cases, 'Date' fields in 'Notice Transaction' table were left blank.

Absence of vital information could prevent the Directorate to identify the current status of a case and thereby defeating the desired objectives of the module.

## **2.9 Conclusion**

The MIS system which was one of the biggest initiatives of the IT processes of the Directorate of Education, Delhi, had been found to have weak input controls and validation checks which had considerably limited the utility of the system. The planning for the system identification and acquisition was weak and feasibility studies were not done before undertaking the project. Deficient planning had meant that there were integration issues among various modules. There was an unacceptable level of manual overrides which affected the integrity of the data. Due to deficiencies in modules the Directorate had to resort to manual interventions leading to risks to the data integrity apart from duplication of work. Thus the basic purpose of modules was not being served.

The Directorate stated that MIS was a legacy system and that technological upgradation and extension issues would be addressed in newer version of computerisation. The Directorate agreed to examine the issues raised by audit and stated that it may consider the possibility of revising the software as part of the Business Process Reengineering effort.

The report was issued to the Government in June 2007 and the reply was awaited (October 2007).

## **2.10 Recommendations**

- (i) IT policy should be devised.
- (ii) IT Security policy along-with a Business Continuity Plan should be formulated and implemented.

- (iii) The Directorate should develop and implement input controls and validation checks to ensure correct data entry.
- (iv) The Directorate should arrange to synchronise data in different modules to display an integrated picture of the database.
- (v) Since availability of database (Server) is a crucial factor the Directorate may consider ways to ensure its availability.

**Annexure-A**

<b>Purchase of Hardware</b>				
<b>SI No.</b>	<b>Year/Period</b>	<b>Name of the Agency</b>	<b>Expenditure (in Rs.)</b>	<b>Remarks</b>
1.	1995-99	NIC	13,31,192.00	Phase-I of computerisation of the Directocate.
2.	2000-01	NICSI	19,07,973.00	Purchase of computers
3.	2001-02	NICSI	38,95,565.00	Purchase of computers, servers etc.
4.	2002-03	NICSI	89,87,789.00	Purchase of computers.
5.	2004-05	NICS I	18,03,507.00	Purchase of computers, printers, routers etc.
6.	2005-06	NICSI	28,65,272.00	Purchase of computers, printers etc.
7.	2005-06	NICSI	3,69,551.00	Purchase of projectors, screen etc.
		<b>Total</b>	<b>2,11,60,849.00</b>	

The expenditure from 1986-2002 was Rs. 71,34,730/- (Rs. 71.34 lakh).

<b>Purchase of Software</b>			
<b>SI No.</b>	<b>Year/Period</b>	<b>Expenditure (in Rs.)</b>	<b>Remarks</b>
1.	2001-02	59,62,364.00	MS Office XP Professional, Windows 2000 Server, MS SQL Server, Seagate Crystal Report, Antivirus for Server, Antivirus for Desktop, Windows 2000 Professional.
2.	2002-03	10,74,674.00	MS Office XP Professional, MS Office & Media
3.	2003-04	48,50,250.00	Windows OS, MS Office
4.	2004-05	37,440.00	Dragon Naturally Speaking Software
	<b>Total</b>	<b>1,19,24,728.00</b>	

<b>Development of Software</b>				
<b>SI No.</b>	<b>Year/Period</b>	<b>Name of the Agency</b>	<b>Expenditure (in Rs.)</b>	<b>Remarks</b>
1.	1986-87	CMC Ltd	65,627.00	1. For development of Personnel Information System of teachers of the Directorate
2.	1992-94	NIEP A	-	2. Development of MIS for Ministerial Staff 3. Payroll system at Headquarters 4. Computerisation of Post Fixation data 5. School data under Computerised Planning for Education (COPE) project.
3.	1995-99	NIC	1,95,000.00	6. Development of MIS on service data of Employees, MIS on school infrastructure.
		<b>Total</b>	<b>2,60,627.00</b>	

The expenditure on Software from 1986-2002 was Rs. 2,60,627/- + Rs. 59,62,364/- = Rs. 62,22,991/- (Rs. 62.23 lakh)

<b>Other Expenditure on computerization</b>				
<b>Sl. No.</b>	<b>Year/Period</b>	<b>Name of the Agency</b>	<b>Expenditure (in Rs.)</b>	<b>Remarks</b>
1.	1995-99	NIC	2,55,966.00	Project management charges and other misc. expenses.
2.	2001-02	NIC	1,10,000.00	Feasibility Study for MIS of the Directorate.
		<b>Total</b>	<b>3,65,966.00</b>	