

MUNICIPAL ADMINISTRATION AND URBAN DEVELOPMENT DEPARTMENT

3.5 Computerisation in Municipal Corporation of Hyderabad

Highlights

The Audit of the computerisation efforts in MCH revealed that all functions of MCH have yet to be computerised and integrated in spite of incurring about Rs 2 crore per year on maintenance of IT infrastructure. Audit noticed security inefficiencies, incomplete and incorrect data in key fields under 'Property tax', 'Births and Deaths' and 'Trade licenses', variations in computation of advertisements fee, etc.

✦ The database servers/application servers, hardware and software for changing the architecture remained unutilised.

[Paragraph 3.5.6]

✦ There was no Database Administrator (DBA) and contract programmers were carrying out the duties of DBA.

[Paragraph 3.5.7]

✦ Business Continuity Plan/Disaster Recovery Plan was absent. This could lead to disruption of activities in case of any unforeseen events.

[Paragraph 3.5.9]

✦ Adequately IT trained personnel of MCH were not associated with development of programmes. This resulted in the business functionality not being properly mapped to IT solutions.

[Paragraph 3.5.10]

✦ There was no documented policy with the MCH related to changes done in applications. It did not have documentation relating to system/server/router/firewall configurations.

[Paragraph 3.5.11]

✦ MCH had no security policy. There was no documentation of security processes. For network monitoring MCH was using free/trial versions of software.

[Paragraph 3.5.13]

✦ The Database contained many unprescribed tax rates. MCH did not effectively use the computing facilities of the available hardware/software.

[Paragraph 3.5.16]

✦ Audit also noticed Application inefficiencies, incomplete data in master tables and incorrect data in key fields under Property tax, Births and Deaths.

[Paragraphs 3.5.17, 3.5.18 and 3.5.19]

3.5.1 Introduction

The Municipal Corporation of Hyderabad (MCH), discharges obligatory and discretionary functions as per the provisions of the Hyderabad Municipal Corporation Act, 1955 and provides civic services and infrastructure facilities

to the citizens of the twin cities of Hyderabad and Secunderabad. MCH has been providing services relating to property tax, 'births and deaths' registration, trade licences, advertisements, etc. The collection of property tax amounted to Rs 160.91 crore, advertisement fee - Rs 7.91 crore, and trade licence fee - Rs 6.56 crore, during the year 2003-04. MCH set up its own Intranet with connectivity established to all its subordinate offices consisting of four zonal offices and seven circle offices functioning under these zonal offices in order to (i) increase the speed of civic services, (ii) provide transparency in the system, (iii) cut administrative delays and (iv) link various internal organs that enhances efficiency.

Online collection of property tax is done through 45 eSeva centres⁴³ and four MCH Citizen Service Centres which also provide other services like registration of births & deaths, trade licenses, etc. The database had 16 lakh(approx.) records pertaining to births and deaths, five lakh(approx.) records pertaining to property tax, 15000(approx.) records pertaining to advertisement fee and 75000(approx.) records pertaining to trade licences. The annual outlay towards maintenance of IT related infrastructure was around Rs 2 crore.

3.5.2 Organisational set up

MCH is headed by a Commissioner who functions under the overall supervision of the Principal Secretary, the Municipal Administration and Urban Development Department. The Information Technology section of the MCH functions under the control and supervision of the Additional Commissioner (Finance).

3.5.3 Information Systems set up

For administrative purposes MCH is divided into four zones, seven circles, 100 constitutional wards and 254 localities. The data centre at its head office is connected to the LAN (Local Area Network) of all its zonal offices through 64 kbps leased lines backed up by ISDN lines. The Head Office has connectivity to eSeva data-centre managed by the Director, eSeva, functioning under the Information Technology and Communication Department. Two leased lines i.e., BSNL (128 Kbps) and VSNL (512 Kbps) were used for web hosting and internet access.

As of March 2005, MCH has one RS 6000 server, and nine other IBM e-series servers at head office and four zonal offices, and four more servers (two database servers and, two application servers) procured (March 2005) for change of architecture. The operating systems in use were AIX for database server, Linux for mail server and development server and Windows 2000 for web server. There were 355 desktops, which were networked and 203 printers. All the applications were developed using Oracle 8i at back end and

⁴³ eSeva is an e-governance project caters to many services like electricity bills, telephone bills, water charges, property tax, etc.

D2K⁴⁴, ASP⁴⁵ and JSP⁴⁶ at front-end. Two Hardware Multi-com Ethernet-III firewalls along with e-trust software firewall, seven Cisco routers and 13 Switches were in use.

M/s. ECIL was entrusted (December 1997) with the development of Integrated On Line Information Processing System (IOLIPS) at a cost of Rs 17.50 lakh with the objective to computerize and integrate all the functions of MCH. The IOLIPS has the following modules, viz., solid waste management, engineering, finance, personal management, inventory management, property tax, trade licences, births and deaths, grievances and estate. Of these, solid waste management, finance, inventory management, births and deaths, grievances and estate modules were not in use.

3.5.4 Objectives, Scope and Methodology of Audit

The IT Audit had the following objectives:

- * studying specified objectives and goals vis-à-vis designed and implemented applications with regard to Property tax, Registration of births and deaths, Trade Licences and Advertisement modules.
- * checking of general and environmental controls and IT application controls in respect of specific applications mentioned above.

Information Technology (IT) Audit was conducted by analysing relevant data tables/records relating to the period 2001-05 (as of February 2005) using CAATs⁴⁷ (IDEA⁴⁸). The results of the review are mentioned in the succeeding paragraphs.

3.5.5 Wasteful expenditure on procurement of RAID Card

Procurement of RAID card in November 2004 did not serve the purpose (August 2005)

IBM RS 6000 F80 server was acquired in 2001 for implementing IOLIPS without the RAID⁴⁹ Card, which was procured only in November 2004 at a cost of Rs 2.18 lakh. Meanwhile, MCH proposed (May 2004) a change to three-tier architecture with cluster server features on the ground that the server with single processor had become obsolete and hence inadequate for their needs. Thus, the expenditure incurred on procuring RAID card for the obsolete server became wasteful. The Commissioner replied (September 2005) that the RAID would be used for other modules to be developed. The reply is not tenable, as procurement of RAID card did not serve any purpose particularly when the MCH planned to switch over to three-tier architecture in May 2004 and the server itself had become obsolete for use with IOLIPs.

⁴⁴ Developer 2000

⁴⁵ Active Server Page

⁴⁶ Java Server Page

⁴⁷ Computer Assisted Audit Techniques

⁴⁸ Interactive Data Extraction and Analysis

⁴⁹ Redundant Array of Inexpensive Disks

3.5.6 Change of Architecture

With a view to changing the architecture from two-tier to three-tier MCH acquired (2004-05) new hardware and software. These included two database servers, two application servers and other hardware along with the required software. Although these were installed in June 2005 the same had not been put to use as of August 2005 for want of data migration. The Commissioner replied (September 2005) that the plan for data and application migration was being prepared.

Control management

3.5.7 Database Administrator

No DBA was in place, posing serious threats to the security of the data

The database administrator (DBA), as the custodian of an organisation's data, is responsible for the administration and management of database management systems. He is also responsible for the creation and management of databases, database performance, monitoring, tuning and capacity planning etc. There was no regular DBA in the organisation exposing the system to risks of inefficiencies. In the absence of DBA, the DBA activities were carried out by the System Administrator/Senior Programmer (contract personnel) for the past one and half years in an ad-hoc manner.

The Commissioner replied (September 2005) that one DBA was being recruited.

3.5.8 Segregation of duties

Segregation of duties avoids the possibility that a single person could be responsible for diverse and critical functions in such a way that errors or misappropriations could occur and not be detected in time. However, in MCH, the programmers (contract personnel) themselves were involved in creation of data structures, developing procedures and executing them in production environment by accessing the production programs, overlapping into DBA activities. This left the database open to manipulation. In the absence of the activity logs, detection of such manipulations would also be difficult.

The Commissioner replied that document for demarcation of the role would be prepared and checks on permission to the production server access and proper access authentication to the database server would be put in place.

3.5.9 Business Continuity Plan and Disaster Recovery Plan (BCP/DRP)

BCP/DRP not in place and might lead to disruption of activities in case of any unforeseen events

Business continuity and Disaster recovery plan is to enable a business to continue operations in the event of a disruption and to survive disastrous interruption to their information systems. MCH has no documented BCP and DRP, and this would lead to disruption of activities in case of any unforeseen events.

Classification of assets based on risk assessment was not done. Business impact analysis involving various events that could impact the continuity of operations and their financial, human and reputation impact on the organisation had not been done.

MCH did not have any backup of core network switches/routers and failure of any such device would result in jeopardizing the entire network especially in peak transaction periods causing interruption to the functionality. The backup media were kept in the same server room, which could prove fatal to the vital data in case of any unforeseen accident like fire and other calamities. Further, recovery from backup media had not been tested in the case of database servers. Fire extinguishers were not available at Circle Offices to reduce the damage in the event of fire.

Audit also observed high attrition rate among contract personnel adversely affecting the continuity of ongoing projects.

Commissioner replied (September 2005) that appropriate steps would be taken to develop the BCP and DRP.

3.5.10 Adequate IT trained personnel not available

Adequate IT trained personnel not associated in development of programs

Most of the MCH personnel were imparted only basic training, and the contract personnel were doing work on computers both at Head Office and Circle Offices. In the absence of suitable IT trained officials of MCH, business functionality could not be mapped to IT solutions and the MCH had to depend totally on contract personnel for all IT related aspects.

Commissioner assured (September 2005) that suitable personnel would be identified.

3.5.11 Documentation

No documentation for system/server/router/firewall configurations, parameter files and changes made to such configuration

To ensure the effective utilisation and future maintenance of a system, it is important that all relevant system documentation be updated. Lack of documentation hampers the continuity of development activity. Audit noticed that the development, maintenance and changes to the applications were done by the contract personnel without preparing documents such as flow charts, data dictionaries, dataflow diagrams, end user procedural manuals, etc. Even the documentation such as SRS and SDD relating to abandoned IOLIPS module developed by ECIL was not available with the MCH. MCH did not also have documentation relating to system configurations, server configurations, router configurations, firewall configurations, parameter files and changes made to such configurations.

Commissioner replied (September 2005) that steps would be taken to prepare proper documentation on system development.

3.5.12 Database design and maintenance

Database design and maintenance was seriously flawed

The database design and maintenance were seriously flawed as indicated below:

- * It was seen from the catalogue of existing database objects, that all the tables (both current and past) related to particular application were placed in the same schema exposing the past data to tampering and other malpractices. This would also result in performance degradation and oversizing of database growth.
- * Objects related to one application, was spreading across different schemas and two application related objects were located in the single schema (objects related to advertisement and trade licences are in the same schema of 'ADVT'). This gives scope for security problems and makes backup activity cumbersome.
- * There was no provision for capturing the important detail of date of generation of Property Tax Identification Number (PTIN), which would help in generation of MIS reports like Number of PTINs generated during a particular period.
- * There was no specified strategy towards most important resource of the organisation i.e., data. Database health checkup was not done regularly. Database has many junk tables generated arbitrarily for creating periodical reports. The operating system slice on which datafiles exist showed '92 per cent' space occupied, which indicates improper database design and lack of database maintenance.

Commissioner replied (September 2005) that steps would be taken to ensure proper care of the database while migrating to new architecture.

Security management

3.5.13 Intranet and Internet Security

No security/email usage/internet/intranet policy exists. There was no licensed IDS system

MCH has no security policy, email usage policy, internet /intranet usage policy and required standards and guidelines that are essential to manage, distribute and protect sensitive information of the organisation. Though financial transactions were done over the Intranet on public leased lines, encryption and PKI features were not implemented making the data vulnerable.

In MCH there was no licensed IDS⁵⁰ system and the trial versions were in use, which doesn't ensure full functionality.

Commissioner replied (September 2005) that documentation and modification implementation policy would be implemented with immediate effect and the IDS would be implemented at intranet level.

⁵⁰ Intrusion detection system (IDS) secures networks and works in conjunction with routers and firewalls by monitoring network usage anomalies and it protects the information system resources from external and internal misuse by notifying administrators of a perceived threat

3.5.14 Database security

Audit trails not verified periodically to ensure proper authorisation to the deletions and updations

Apart from 'Sys' and 'System' there were three more users with DBA privileges granted, though not even a single DBA had been administering database thereby exposing the database to risks of unauthorised manipulations. It was observed that eSeva user entrusted with collections of taxes had 'create table, and create view' privileges though not required and only 'insert' privilege on collection table would suffice.

Database Audit trail has been enabled on the "collection" tables. The trail gives the details of the actions performed on those tables. As seen from the trails there were 'updations' and 'deletions' made on this table but the updated value and the old values were not captured in logs. These audit trails were not verified periodically to ensure that the deletions and updations had proper authorisation.

Commissioner replied (September 2005) that a clear policy in this regard would be formed. He also stated that the additional privileges given to e-Seva user have been revoked and additional DBA grants have also been deleted.

3.5.15 Password policy

No documented password policy exists

The Password Policy was found to have the following deficiencies causing threats of unauthorised attempts and modifications etc.:

- * No mandatory change of password after first log-on, no minimum length of passwords, no restriction for number of login attempts;
- * No system of maintaining emergency passwords for servers, network devices, etc. dealt by the System Administrator (a contract personnel). At counters relating to a particular circle same username and password were used by multiple users;
- * Application displayed all the usernames in dropdown list, leaving scope for intrusion by knowing only the password.

Commissioner accepted the audit objection and stated (September 2005) that all security related issues would be addressed in the new security documentation to be developed.

Error management

3.5.16 Computation of taxes

Computing facilities of hardware/software not effectively used

Computation of property tax, trade licences and advertisement fees were not done by the system. Instead the tax was always computed by the concerned valuation officers and entered in the input form. It was observed that property tax data contained 67906 records where the benchmark rates were not applied. Even if the least of the benchmark rate (Rs 0.40), where category is residential (22797 records), is applied, 7896 records showed short tax assessment amounting to Rs 56.81 lakh. Thus the MCH did not effectively use the computing facilities of the hardware and software. It was only using the database with simple interface for collection of taxes.

Property tax

3.5.17 Software validations

As of August 2005 the bill collectors were still doing many collections manually and such transactions were updated from local servers at Circle Offices. There was no filtration of data accessed at the Circle Offices. This resulted in payments towards records kept under delete status in the database.

Many key fields like door numbers, assessee names and plinth area were kept blank in the database due to lack of validation, leading to the possibility of non-communication of demand notices to the assessees.

3.5.18 Incomplete data

It was observed during audit that the database consisted of incomplete data or inaccurate data relating to property tax (*Appendix 3.12*) due to the following reasons:

- * Data entry errors
- * Incorrect/inconsistent information provided by the field staff in the input forms/assessment register.

Commissioner replied (September 2005) that necessary rectification measures have been taken up.

Births and Deaths

3.5.19 Data entry of births and deaths from 1986 to 2001 was outsourced (September 2001 and January 2002) to different private agencies at a cost of Rs 16 lakh. The payment was released to the private agencies after getting the clearance certificate from the concerned Health Section of MCH. Audit noticed that the data was incorrect, as many of the key fields like ward/circle numbers were not fed properly and this was stated to be due to wrong capture of data by agencies. Though the data exists with the MCH since December 2002, no concrete steps have been initiated by it (August 2005) to correct the data.

Test-check, through web, also disclosed irregularities in births and deaths data pertaining to 2001 and afterwards. There were duplicate records with same registration number in births and deaths data. Key field like place of birth contains values like 'not stated', and duplicate records with different registration numbers with same details existed. There was no provision for indicating twins in the certificate/register.

Commissioner replied (September 2005) that the measures to purify the data are being planned by checking with original records.

Engineering

3.5.20 The main objective of the module is to collect information regarding the works undertaken by the Engineering Department and produce reports as desired. Each work is allotted a unique identification number i.e., Work Identification Number (WIN). This covers technical sanctions, work awarding, work order issue, stage of work, bill preparation and contract registration. Except for generation of WIN code the engineering module of IOLIPS was not being used. Even the work status, which can be viewed through the website, was not up to date (August 2005).

Commissioner replied (September 2005) efforts are being made to link it up to the financial module.

Advertisement

3.5.21 MCH had been collecting advertisement fee from Hoardings, Glow/ Neon Sign Boards, Brand Names, Mobile Advertisements, etc.

It was found that the Advertisement module was not being used effectively, as the fee was being calculated manually, leaving incomplete data in the database.

Commissioner replied (September 2005) that all the records were updated as on 31 March 2005 and the discrepancies rectified.

3.5.22 Conclusions

MCH decided, as a matter of policy, to develop Integrated Online Information Processing System as a part of *e-governance* to enhance civic services to the citizens. Although MCH has been spending around Rs 2 crore per year on maintenance of infrastructure relating to Information Technology it failed to implement the computerisation of all the functions of MCH and integrate them. Critical issues like logical access control measures, back up and business continuity procedures, etc. were not addressed. While the environmental and application controls were weak, no documentation policy or security policy existed with the MCH. The computerised system suffers from inadequate input controls and poor validations, resulting in generation of incomplete and inaccurate data. Data relating to property tax, birth and deaths and advertisement fee was incomplete and incorrect in many cases causing generation of faulty MIS reports rendering decision making risky. It could not also use effectively the computing facilities of the hardware/software available with it. These shortcomings resulted in short assessment/collection of taxes.

3.5.23 Recommendations

- ✎ There is an urgent need for developing, testing and implementation of proper Business Continuity Plan and Disaster Recovery Plan.
- ✎ Suitable personnel need to be identified and be associated with the development of applications so as to create useful applications.

- Access logs should be created and maintained. Review of audit trails should be conducted periodically to take corrective action.
- Proper password policy should be framed, documented, circulated, and maintained.
- Proper maintenance and tuning of the database should be done periodically to maintain the health of the database.
- Efforts should be made to assess the demand through the application system itself instead of manual calculation.
- There is a need to redesign the forms with proper validations; modifications to the data from the back-end should be stopped.
- Data should be captured for all the field items, ensuring correctness, consistency, completeness and integrity. Efforts should be made to purify the data.

3.5.24 The above points were discussed with the Commissioner, Assistant Commissioner (Finance) and all concerned officers of MCH in the exit conference held in September 2005. The recommendations were also discussed. The Commissioner accepted the points brought out by Audit and stated that rectificatory measures would be taken for effective delivery of civic services and other infrastructure facilities to the citizens of the twin cities of Hyderabad and Secunderabad. The Secretary to Government endorsed the views of the Commissioner.