

CHAPTER III

INFORMATION TECHNOLOGY AND COMMUNICATIONS DEPARTMENT

3.4 Information Technology Audit of eProcurement

Highlights

The State Government, as part of its e-Governance initiatives, is implementing eProcurement, identified as one of the key thrust areas, for procuring of works and products, using Information Technology. Though the efforts of the Information Technology and Communications (IT&C) Department, were laudable and had addressed problems associated with bidding in calling for/submission of tenders, etc. the Project suffers with many deficiencies associated with software, policies, procedures and enterprise controls. Backup implementation, retention of important logs were inadequate. Major shortcomings in the implementation of the project, like ineffective implementation of automatic bid evaluation, non-standardisation of bid document, security problems, non-customisation of application, etc. were also noticed.

- ◆ Though the Government issued orders (July 2004) that all works/goods/services, be procured using the eProcurement platform, only 10 Government departments, 15 PSUs, 58 urban local bodies and five Universities out of 30 Government Departments, 36 working PSUs, 134 Urban Local Bodies and eight Universities are using the facility as of July 2006.

[Paragraphs 3.4.1 and 3.4.7.1]

- ◆ Automatic Bid evaluation was not implemented effectively and Backup implementation, adequacy of logs, retention of important logs were also inadequate.

[Paragraphs 3.4.7.2 and 3.4.8.1]

- ◆ Procurement processes across the user departments were not standardised, and customisation and validation to suit the functional requirements of individual departments was not attempted by the Vendor.

[Paragraphs 3.4.7.1, 3.4.8.2 and 3.4.8.3]

- ◆ Security Audit as envisaged, was not conducted as of July 2006. Consequently, the eProcurement platform was not used for transacting tenders for the projects taken up under World Bank and other multilateral bank loan assistance.

[Paragraph 3.4.9.2]

- ◆ Public Key Infrastructure (PKI) implementation was inadequate. eProcurement could not rule out possible cartel formation.

[Paragraphs 3.4.9.3 and 3.4.9.5]

3.4.1 Introduction

E-governance or electronic governance is the delivery of government services and information to the public using electronic means, referred to as

information technology or 'IT'. Use of IT in government facilitates a competent, prompt and transparent method for sharing information with the public and other agencies, and for performing government administration activities. Government of Andhra Pradesh as part of its e-Governance initiatives, identified eProcurement as one of the key thrust areas involving all the Government departments/PSUs/ Autonomous bodies and the Universities. The eProcurement platform consists of a Tender Management System, Rate Contract /Buy Site (catalogue based purchases), Market Site and Auctions modules. The TMS offers automation in the workflow, customised to individual departmental/ organisation's needs. It creates tenders right from the publishing of notice inviting tenders (NIT), bid submission by contractors electronically, bid opening (technical and price bid) and upto selection of successful bidder. The general public can view the NIT and registered suppliers can download the tender schedule document and submit their bids online. The suppliers upload the required scanned documents and certificates with their bids.

The objective to cover all departments under eProcurement platform had not been achieved even after two years of issue of orders

Price Waterhouse Coopers (PWC) was appointed as consultant for identifying the areas and preparing requirements, etc. C1 India Pvt. Limited (Vendor) was selected as the partner for the State Government to set up the eProcurement platform through bidding and evaluation. The State Government had entered into an agreement in June 2002 with the vendor for development, operation and maintenance of eProcurement portal by the vendor at its own cost. The portal was operational from 29 January 2003. The project initially covered four departments /agencies viz., AP Technology Services Ltd (APTS), AP State Road Transport Corporation (APSRTC), Commissionerate of Tenders (CoT) (covering Irrigation and Command Area Development Department and Roads & Buildings Department) and AP Health, Medical Housing and Infrastructure Development Corporation (APMHIDC). The pilot phase which was initially operative upto March 2003 was later extended upto September 2004. Later an agreement was entered with vendor in April 2005 (effective from 1 April 2004) with a desire to rollout the eProcurement solution to all departments, PSUs and local bodies. The agreement envisaged that all hardware and software would be bought (by the Government) at the end of three year (agreement) period i.e. by March 2007.

As of July 2006 the eProcurement platform was being used by 10 Government Departments, 15 PSUs, 58 Urban Local Bodies and five Universities, and 16260 tenders have been invited on the portal with an aggregate transaction turnover of Rs 35703 crore.

3.4.2 Organisational set up

Information Technology and Communications department (IT & C) headed by the Secretary to Government is the nodal agency for the eProcurement platform. The Secretary is assisted by a Project Manager in the State Secretariat. The Managing Director, APTS maintains the eProcurement Fund (collected at 0.04 *per cent* of Estimated Contract Value (ECV) from each successful bidder from April 2004) which is to be utilised for infrastructure development of eProcurement platform. Each individual department using the

eProcurement platform would carry out the workflow right from indent creation to selection of successful bidder.

3.4.3 Audit objectives

The IT Audit of eProcurement platform had the following objectives:

- To evaluate Tender Management System (TMS - component of eProcurement) web application
- To analyse the data for completeness, integrity, reliability and accuracy
- To evaluate the security controls built into the system
- To review whether objectives of the eProcurement have been achieved as envisaged

3.4.4 Audit criteria

Audit used the criteria as laid down in various manuals and government orders, the requirements stated by the departments in the form of 'As is process' document, 'To be Process' document and mapping of the same to the application.

3.4.5 Scope and Methodology of Audit

The Review of the performance of the Tender Management System¹ - Component of eProcurement application was conducted (January – July 2006) with relevance to policies, procedures developed and implemented in respect of works (single and double packet²) and products. Data pertaining to the period 29 January 2003 to 31 March 2006, was checked for completeness, integrity and accuracy. The data was analysed using a Computer aided Audit Tool, IDEA³. Tender Management System was reviewed with test users created for audit purpose. The results of the review are discussed in the succeeding paragraphs.

3.4.6 Financial arrangement

While entering into the agreement with the vendor it was decided to have Tender hosting charges of Rs 4500 per tender to be paid by the respective departments and Transaction fees of 0.24 *per cent* of the ECV payable to the vendor by the successful bidder on receipt of purchase order / work order for all tenders published through eProcurement. The Government through an order issued in February 2005 changed the pricing structure giving it retrospective effect from April 2004. According to the new pricing structure transaction fee at 0.04 *per cent*⁴ of ECV by all participating bidders was to be payable to the vendor. The hosting charges were however, dispensed with.

¹ as only this component was implemented fully

² Single packet means the technical bid and financial bid in a single sealed cover and double packet means the bids requiring both the technical and financial bid in separate sealed covers in the manual system

³ Interactive Data Extraction and Analysis

⁴ With a cap of Rs 10000 for ECV upto Rs 50 crore and Rs 25000 for ECV above Rs 50 crore

Each successful bidder was also to pay 0.04 *per cent* of ECV (from April 2004) towards eProcurement Fund.

As of May 2006, accumulations to the eProcurement Fund maintained by APTS amounted to Rs 90.27 lakh. As per the Government guidelines (August 2005) for operating the eProcurement Fund 50 *per cent* of the eProcurement Fund charges received on behalf of the Departments/ Agencies in a financial year, would be spent on the respective Department's/ Agency's specific requirements to sustain IT initiatives within their Departments/ Agencies, and the remaining 50 *per cent* retained with APTS to be spent on initiatives taken up by IT & C Department to sustain eProcurement project overall. The IT & C department had however, no information on the actual expenditure incurred by APTS from this Fund.

3.4.7 Programme implementation

3.4.7.1 eProcurement platform not fully operationalised

Procurement processes across the departments were not standardised

The portal was operational from January 2003 with a targeted procurement worth Rs 250 crore during 2002-03. Government issued orders in July 2004 for procuring all the Government works with estimated value more than Rs 10 lakh and above and goods and services with estimated value more than Rs 5 lakh through eProcurement. It was however, observed that as of July 2006 the platform was being used by only 10 Government Departments, 15 PSUs, 58 Urban Local Bodies and five Universities out of 30 Government Departments, 36 working PSUs, 134 Urban Local Bodies and eight Universities. APSRTC, a State Undertaking, chosen as a user for the pilot phase had itself not started eProcurement as of July 2006.

The Project Manager attributed this to non-standardisation of procurement processes among procurement departments.

3.4.7.2 Autobid not effectively utilised

Autobid module was ineffective due to non-availability of contractor details database

The feature of Autobid facilitates automatic evaluation of tenders based on the details of contractors database. In the absence of an updated contractor's database containing details like annual turnover, previous experience in value and quantity, existing commitments and other key information relevant for evaluation of tenders, to be utilized by the autobid module, the autobid module could not be effectively implemented. Consequently, the evaluation of tenders with regard to contractor details had to be done manually, nullifying the stated objective of reducing the time taken in evaluation of tenders and also ensuring a faceless operation.

3.4.7.3 Development of alternate software by APTS – Duplication of efforts

APTS was asked to develop alternate software though Government was to buy back eProcurement platform from C1 India by March 2007

In response to an audit query, the Project Manager stated (May 2006) that the eProcurement application provided by the vendor had the required functionalities to service transactions costing below Rs10 lakh also. It was seen that a Sub-committee constituted to review the financial business model

of eProcurement solution had recommended (September 2004) development of an alternate eProcurement platform by APTS. Government accordingly issued orders (February 2005) to develop an alternate platform for works, goods and services costing Rs 10 lakh and below for all departments/ PSUs/ Local bodies stating that developing and operating an eProcurement platform would provide necessary experience to APTS in a niche area. It was, however, observed that the APTS was seeking a technology partner to develop such alternate platform. Thus, when a functional and tested application was available for buy back, Government's decision to develop alternate software with same functionality was inappropriate.

3.4.7.4 Conflict of Interest

It was seen from the technical bid submitted by the vendor that it had been a partner of PWC. Despite this, Government continued with PWC in the technical and commercial evaluation of the bids. Even after the selection of the vendor, Government continued to involve PWC in all critical areas like reviewing price structure and the future business model.

3.4.7.5 Intellectual Property Rights

Government has no share of intellectual Property Rights (IPR) on the TMS application

Government had contributed domain expertise for developing the tender management software and was therefore entitled to share the Intellectual Property Rights (IPR) of the TMS application. The reply of the department that vendor, alone had the IPR for Tender Management Software is not acceptable as the Government should have its proportionate share on IPR.

3.4.7.6 ESCROW Account

Full functionality of TMS software deposited in ESCROW account had not been ensured

Government entered into a tripartite Escrow agreement with the vendor and Escrowtech India (Chennai) in April 2006 for depositing the source code of Tender Management Software so as to safeguard the interests of the Government. Before creating an Escrow account⁵, the updated source code was to be duly verified and validated. Government appointed the Institute for Electronic Governance (IEG) (at Hyderabad) for verifying and validating the source code in deposit material and to furnish the necessary certificate to the effect that the source code was the same as that in the live eProcurement application serviced by the vendor on its behalf. IEG had given (April 2006) a report stating that it had checked the total functionality of the software. It was, however, observed that verification and validation done by IEG did not include super administration and departmental administration module which forms part of TMS application. Thus, the full functionality of the TMS software (deposited in ESCROW account) had not been ensured.

⁵ A legal arrangement whereby a software source code is delivered to a third party (called an ESCROW agent) to be held in trust as per conditions in a contract

3.4.7.7 Procurement of low capacity hardware and software

Infrastructure created was not in accordance with the contractual agreement

As per the agreement, all servers were to have 2.7 GHz⁶ processors and Operating System (OS) Windows 2003 Enterprise Server. It was, however, noticed that the servers had lower processors of 700 Mhz⁷ and Windows 2000 Advance Server OS which is a older version. In response to an audit enquiry the department stated (July 2006) that these lower configuration of hardware and OS created no performance issues. This was not tenable as the higher configurations were prescribed in the agreement considering the capacity planning and future growth needs when more departments join eProcurement platform. Also, contrary to the agreement conditions, instead of a Hardware Load Balancing Switch a Software Load Balancing which is memory intensive had been configured on the server.

3.4.8 Application performance

3.4.8.1 Business Continuity Plan/Disaster Recovery Plan

As of July 2006, BCP/DRP document was not approved by the Government. Database server application logs showed that database backup had failed from 29 March 2006 to 01 April 2006 due to insufficient disk space. This indicated that the daily backups were not available for these days. It was noticed in a test-check (March and April 2006) that the backup of transaction logs has completely failed. It was also observed that the backups were taken on disks instead of on tapes. Thus absence of a BCP/DRP system was at risk of losing important information.

3.4.8.2 Customisation

Basic customisation was not attempted by the vendor to suit the functional requirements of individual departments

All necessary customisations to the Tender Management Software to meet the functional and work flow requirements of the participating departments was to be carried out by the vendor. It was noticed that the vendor had not attempted the required customisation to suit the functional requirements of individual departments for the meaningful utilisation of eProcurement platform.

Though the feature of 'Demand Aggregation'⁸ was provided for APTS, the application did not provide it for APHMHIDC, where the consolidation continued to be done manually. Lack of this feature even as in June 2006 also indicated that there were gaps in the 'Requirement Study'.

3.4.8.3 Validation Controls

The Vendor had not attempted the required validations

All necessary validations to the Tender Management Software to meet the functional and work flow requirements of the participating departments was also to be carried out by the vendor. It was noticed that the vendor had not attempted the required validations. Absence of various validation checks in the

⁶ Gigahertz

⁷ Megahertz

⁸ Demand Aggregation facilitates the consolidation of requirement of the department

system design made the system vulnerable to data inaccuracies as is evident from cases cited below:

- While creating indents for common products, in delivery details, the ‘delivery period’ ranged from zero days to 11111 years. No validation for the delivery period was there in the application. The department replied that validation for the field would be fixed in the range from 1 to 365 days.
- While inviting the tenders, the department has to specify the period of contract. However the application allows entering values like 10000 months in this field. The department replied (May 2006) that the data element was not defined for maximum value as the departments had not come up with permissible maximum contract period. It was however, agreed to set a maximum value of 180 months for the period of contract.
- As per government orders of July 2003 the ceiling for tender premium is 10 per cent (later amended to 5 per cent in November 2004). However, there were 2055 cases where it was more than 5 per cent which includes departments other than PSUs. In 637 cases where the excess value was quoted as 15 per cent and in one case it was recorded as 100 per cent. As such the software was not validating the input data so as to implement the Government orders. Department replied that this rule was not uniformly imposed across departments and PSUs and as such is not built into the application. Further the PSUs keep changing the limits from time to time. Departments are accountable if they have accepted tenders beyond the premium limits applicable to them. This indicates that proper customisation of the application had not been done to suite individual departmental requirements. The reply also indicates the inappropriateness of the change management system.

3.4.8.4 Incomplete Database

- There were 2752 records where after opening of the price bids the process was being completed offline and the application was not updated in terms of closing the bids. Thus the database was incomplete.
- Irregularities of incomplete capture of data like supplier details, log details of the transactions were noticed in the Database.

3.4.9 Security

3.4.9.1 Departmental Admin User ID operated by Vendor

Departmental activities like creation of users, updating departmental masters, etc. are to be controlled by each department only through an authorised official using concerned departmental admin user IDs. However, it was noticed that all the departmental admin user IDs except for the APHMHIDC and APTS were operated by the vendor.

The Project Manager stated (May 2006) that most of the participating departments were novice to IT systems and lack the required skills. The contention is not acceptable as the whole system was operated at the discretion of the vendor and no efforts were made by the Government to make the

Departments self reliant despite the fact that the Government was to take over the project by March 2007 from the vendor.

3.4.9.2 Security Audit

Security Audit as envisaged was not conducted as of July 2006

PWC had conducted the post implementation audit of eProcurement application in August 2003 covering mainly the implementation aspects. As per the agreement of June 2002, the Government was to appoint an agency to conduct security audit of eProcurement platform at its own cost. Further, as per the subsequent agreement (April 2005), Government was to appoint a mutually acceptable independent agency to conduct the security audit at a suitable interval not exceeding 12 months. The World Bank also intimated (January 2006), that a Security Audit of eProcurement for all bank funded projects be conducted by an independent third party with no conflicting interests. It was noticed that as of July 2006, no Security Audit of the Project had been conducted. Consequently, the eProcurement platform was not being used for the projects taken up under World Bank and other multilateral bank loan assistance. This indicates that the eProcurement platform was being used without any satisfactory assurance on the security of the system.

3.4.9.3 Public key infrastructure (PKI) implementation

PKI implementation was critically affected

eProcurement Public Key Infrastructure (PKI) solution, has followed two – factor authentication, which involves PKI solution along with normal username and password authentication. PKI was enabled on 1 March 2005. PKI provides for a digital certificate that can identify an individual or an organisation and directory services that can store and, when necessary, revoke the certificates. The process involved in PKI implementation is (a) Digital Signature/Verification Process (b) Data signing and verification (c) Encryption/Decryption process (d) Transfer process.

It was observed from the data that verification of the signed price bid status including decryption was being done only from December 2005 whereas PKI has been implemented from March 2005. This indicated that verification process had not been done before December 2005.

The department replied (July 2006) that the Digital Signature was introduced (March 2005) for the data along with PKI implementation. At the time of bid opening however, it was decrypted and after verification stripped of the signature because it was stored in the same column and in the same table. This process however, destroyed the audit trail and the encrypted data in the tables itself does not conform the date and time of encryption/decryption processes. Even as of March 2006 the date and time of encryption were not available in the audit trail. The department replied (August 2006) that it was very difficult to maintain Database application log for each and every process related activity. The reply was not tenable as the log needs to be maintained capturing details like date and time of encryption and decryption events.

Further examination of the data revealed that:

In the table containing the details of bids in an encrypted form which are digitally signed with the supplier certificate, during the period 1 March 2005 to 31 March 2006:

- There were 39647 (out of 59312 records) records where price bid data digitally signed by the supplier using his digital certificate was blank. For seven records the department admitted (July 2006) that the cause of discrepancy had not been identified and required further investigation. Even for rest of the records where attached signature was used the signed data was not available. The department admitted that in hindsight it was indeed a shortcoming. The lack of signed price bid data makes the PKI implementation itself questionable.
- There were 4315 records (out of 59312 records) where the encryption key value was blank. The department replied that encryption key was stored in encryption key table. The reply is not tenable as encryption key value could not be blank as this stores information of all users while submitting the commercial bids.
- There were 303 records (out of 59312 records) where certificate serial number and certificate holder details column values were blank. The department replied that out of 303 records, nine records were accounted for test tenders. For the remaining 294 records the department could not explain the lack of details.

Further, 62 records indicated that suppliers could log in to the application without a digital certificate. When pointed out the department replied (August 2006) that the investigation was in progress.

The above points indicate that the PKI implementation was critically flawed. Apart from raising serious security concerns, it has also adversely affected the effective utilization of PKI.

3.4.9.4 Audit Module

Logs maintained were inadequate and incomplete

The purpose of a log would be to record all the activities to keep audit trail and to fix responsibility in case of any unforeseen activities in the application. As per the requirements, the application has to provide the feature of audit trail. It was, however, observed that even where the data was critical and sensitive, including the activities of the administrator, the logs maintained were inadequate and incomplete.

Vendor was requested to integrate 'Access Control' software by end of March 2006 at its own cost as per its obligations under the contract agreement to contain possible misuse of system by the Administrator. However, no such tools had been deployed as of June 2006 and as such the audit trail was not protected against misuse.

Audit logs have to be reviewed periodically by a responsible official other than the service provider so as to initiate action to improve or to plug the irregularities noticed in the system. It was noticed that the Audit logs were being reviewed by the vendor itself and were retained for a period of six months only. This was against the principle of segregation of duties. The

department's reply (June 2006) that this was due to the difficulty in reviewing the huge volumes of transactions involved is not acceptable. Further, the non-retention of the logs without conducting any periodical audit /review either by Government or a third party could lead to possible destruction of evidence.

It was further noticed from the available log details that 959 gaps (out of 1161244 records) were present in respect of auditids.

3.4.9.5 Possible Cartel formation not ruled out

Payment Gateway services were not available for making payments of EMD, etc. resulting in possible cartel formation

As per the Agreement (April 2005), payment gateway services (electronic payments) was to be provided. This service was made available only for payment of transaction fee to the vendor from July 2006 and not for making payments, like Earnest Money Deposit, etc. to the department. Therefore, contractors/suppliers have to approach the departments for submitting their Demand Drafts. Contractors/ suppliers were also required to submit hard copy proof of other documents before opening of the bids. It was seen that though the electronic bids submitted by the suppliers ranged from 20 to 60 per NIT, hard copies of the bid documentation were actually submitted in most of the cases by one to three bidders for opening of the price bid indicating even the cartel formation is not ruled out (*Appendix 3.5*). Even though Government issued orders in December 2005 contemplating suspension of tenderer in case of failure to submit the hard copies of DD/BG⁹ for EMD, DD for transaction fee, etc. within the stipulated time, these orders had been kept in abeyance even as in March 2006. The same would not even be required if e-payments were accepted and updated contractors database was maintained online (thus hard copy submissions would not be required) ensuring a faceless operation. Absence of the same defeated a key objective of the Project.

3.4.10 Conclusions

The pioneering initiative of implementation of the State-wide eProcurement platform did not yield the desired results. The objective to bring all departments under eProcurement platform was not achieved. The objective of implementing an automatic bid evaluation system could not be achieved. Basic customisation for all departments to suit the functional requirements of individual departments, was not attempted by the vendor. There were problems associated with standardisation of procurement processes across the user departments, implementation of PKI, backup implementation, retention of important logs, data irregularities, etc. The objective of preventing possible cartel formation could also not be fully achieved. Logs maintained were also inadequate and incomplete.

⁹ Bank Guarantee

3.4.11 Recommendations

- Government should ensure that the objective that all its works/goods/services, be procured only by using the eProcurement platform, is fulfilled.
- Contractors' Database should be operationalised immediately to implement auto bid evaluation effectively.
- Business Continuity Plan, etc. should be drafted, approved and implemented as per requirements.
- Government needed to standardise procurement processes among all user departments.
- Problems associated with PKI implementation should be sorted out without delay.
- Controls should be established and implemented properly to ensure 'capture and maintenance' of adequate and complete audit logs.

The above points were referred to Government in August 2006; reply had not been received (September 2006).