CHAPTER 22

Implementation of e-procurement in the Government of Andhra Pradesh: A Case Study

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ABSTRACT

Procurement is generally regarded as a sensitive function in the public sector and is rarely transparent . It is for this reason that public procurement is one of the areas in governance that remains insulated against any process improvements. Governments the world-over are under constant pressure to meet the expectations of the citizens and to do more with the less resources that are available to them. There is a growing realisation in governments that usage of information and communication technology (ICT) can remove the existing administrative barriers and make the government's procurements more efficient, accessible and transparent, besides being cost-effective.

E-procurement implementation is an attractive quick-win solution for governments, since it results in cost cutting, introduces different sourcing practices, and delivers other quantifiable benefits. However, there is little history of extensive use of e-procurement in the public sector in India. The present case study highlights the successful implementation of a state-wide e-procurement platform across several government departments, public sector units, urban local bodies in the state of Andhra Pradesh and the quantifiable benefits it has delivered to the suppliers and the government directly, and to the society, indirectly. This path-breaking initiative has provided transparency, fairness and equal opportunity to private entrepreneurs who are now able to submit bids online on an anywhere and anytime basis for government contracts and sell products or expertise to government agencies through the e-procurement portal.

Introduction / Background

The traditional systems of procurement in government departments through manual modes suffered from various problems such as inordinate delays (approximately 4 to 6 months) in tender/order processing, heavy paper work, multi-level scrutiny that consumes a lot of time, physical threats

to bidders, cartel formation by the contractors to suppress competition, human interface at every stage, inadequate transparency, discretionary treatment in the entire tender process, etc. Though it is known to the departments that their traditional processes are inefficient, hardly any effort was taken to improve the system for obvious reasons .

The Andhra Pradesh government had felt a need for wide-ranging reforms in the public procurement process in order to achieve simplification of procedures, greater transparency, better quality of work, fair competition etc. The cabinet sub-committee set up for this purpose has recommended e-procurement, a web-based government-to-business IT project in September 2001 as a solution for all these problems. The plan was to effectively implement and sustain public sector reforms and to bring in new channels like auctions and reverse auctions online for greater efficiency. It was envisaged to revolutionise the manner in which procurements are done in government. The government departments would be conducting their end-to-end procurement related transactions, right from invitation of tenders to issue of supply order remotely in a new environment facilitated by the emerging internet technology. The initiative was taken up in an innovative Public Private Partnership model and the private partner was selected in July 2002 through a competitive tendering process. A pilot project was launched in January 2003 and the operations were rolled out to all departments of the state government in July 2004.

Core Functionalities of e-procurement Marketplace

Extensive studies were conducted to document the procurement practices across several government departments, public sector units and it was decided that the proposed E-procurement Marketplace would include the following core functionalities to cater to the requirements of user departments.

- Electronic tendering
- Publication of notice inviting tenders (NIT)/Invitation for bids (IFB)
- Issue of tender documents to prospective tenderer
- Submission of tenders
- Receipt of tenders
- Opening of technical bids
- Evaluation of tenderer compliance to the qualification criteria
- Opening of price bids of qualified tenderer
- Approval of tender
- Issue of purchase order
- Contract management
- Rate contract based procurement

- Dynamic pricing engine (auction, reverse auctions)
- Self-service zones for vendors
- Search engines, announcements and business news

The e-procurement platform offers a superior level of security with secure socket layer (SSL) encryption, strong authentication with digital certificates, PKI encryption of data and speed to conduct real-time bidding over the internet. Since its launch in January 2003, the portal has processed nearly 30000 transactions worth Rs 46500 crores and yielded cost savings to a tune of Rs 2800 crores to the Public Exchequer.

Objective

The prime objectives of e-procurement are demand aggregation, reduced inventory cost, consistent procurement procedures across departments, reduction in cost of procurement, fair and equal opportunities to all suppliers and efficient tendering processes.

Technology

Details of the Technology used

The application is primarily developed on Microsoft platform using the following several key technologies within its architecture.

Web technologies	Multimedia	Data base	OS
ASP 3.0. Web Services. C# .NET. XML VB 6.0 ASP.NET Visual Basic	Adobe Photoshop 6.0 Dreamweaver 3.0	SQL Server 2000 Standard edition	Windows 2000 Server

Security Components

Component	Standards
Digital certificate	X509 v3 certificates
Certificate revocation List	X509 v2
Communication with external cryptographic modules (such as smart card/hardware token)	PKCS #11

Storage and transmission of private key and certificate	PKCS #12
Communication with directory services	LDAP v3, X500
Standard for SHA-1 message digest algorithm	FIPS 180-1
Asymmetric key algorithm	RSA
Hash algorithm	SHA-1/ MD5
Symmetric key algorithm	3-DES, DES

- Class 2 certificates issued by a certifying authority recognised by CCA India in compliance to the IT Act 2000 are used for authentication
- Public key infrastructure is implemented for encryption of sensitive tender data at the instance of bid submission.
- SSL technology for secure transit of data from client to server

Technology Architecture

3-tier architecture scalable to n-tier

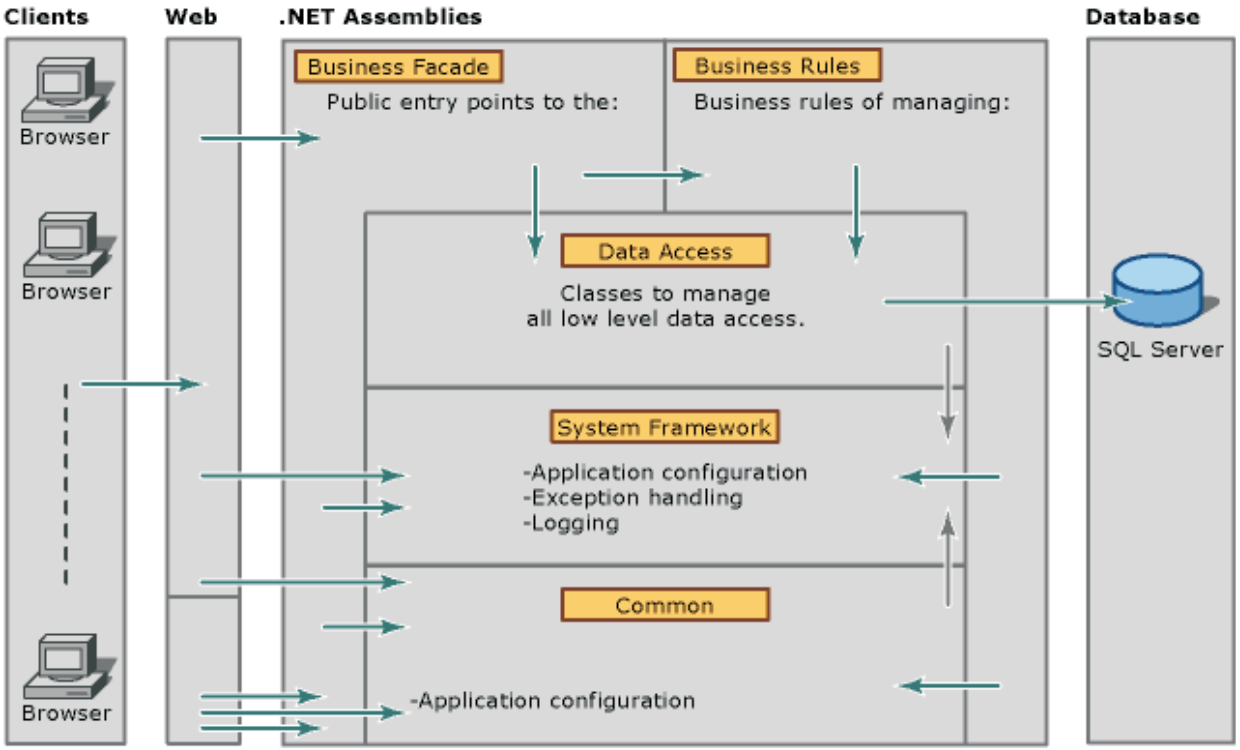
Presentation Tier The presentation tier is supported by two load-balanced web servers running the Microsoft Windows® 2000 Advanced Server operating system and Internet Information Services (IIS) version 5.0. The web servers are hosted on two HP ProLiant DL 580 dual-processor computers with 2 gigabytes (GB) of RAM and RAID 5 features. The web servers are isolated by external and internal firewalls creating a DMZ.

Business Logic Tier The business logic is encapsulated using Microsoft COM+ technology, and handles a range of tasks including authentication, authorisation, and workflow management. The business logic tier is co-hosted on the same servers supporting the presentation tier.

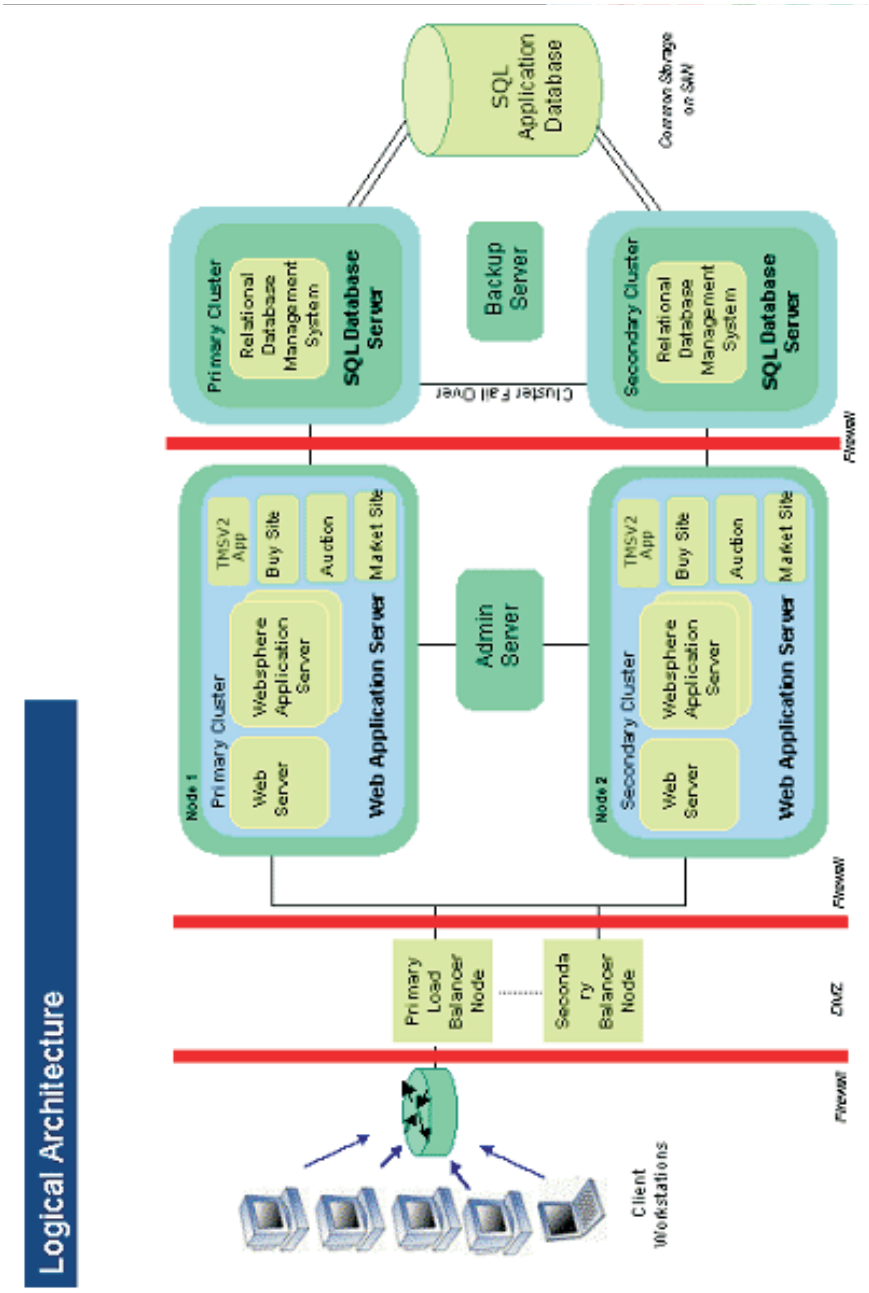
XML Data Layer Tier The XML data layer handles communication with web services. The XML data layer is co-hosted on the business logic tier.

Database Tier The 60 GB relational data base runs on Microsoft SQL Server™ 2000 Enterprise Edition, part of Microsoft Windows Server System™ integrated server software, and Windows 2000 Advanced Server. The data base is hosted on two HP ProLiant DL 580 dual-processor computers with 2 GB of RAM and RAID 5 features. The servers are configured in a two-node active/passive cluster to ensure high availability. Storage is on a system area network. A disaster recovery site in Delhi backs the Hyderabad production site.

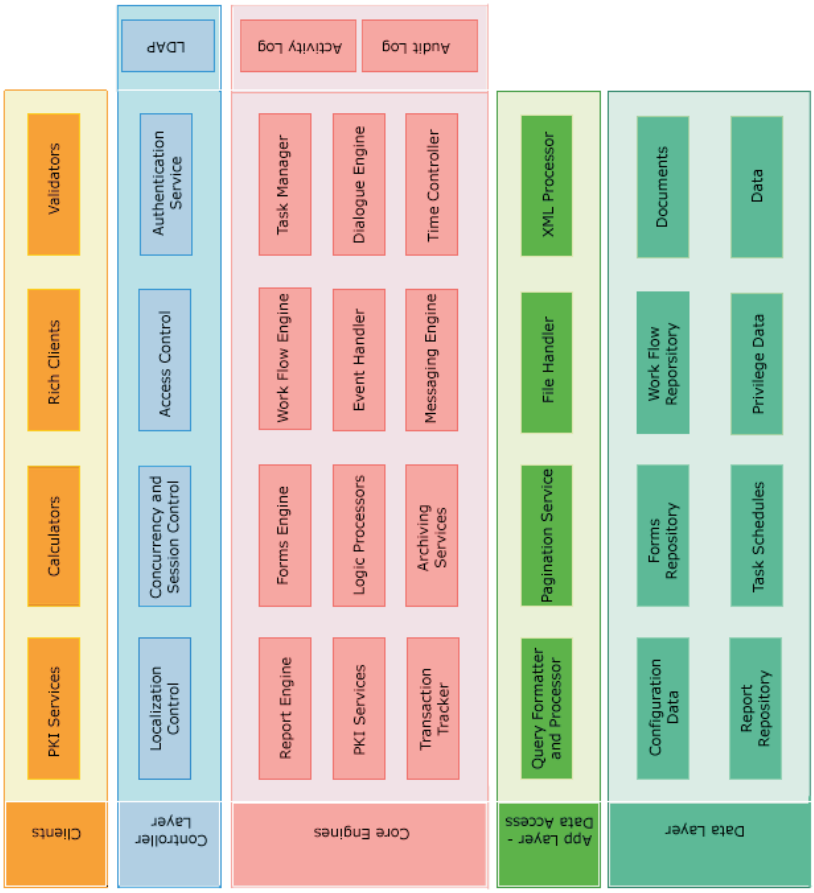
Technical Architecture



Note:
Arrows to be interpreted as "... using ...". for example .: The Data Access subsystem is using System Framework subsystem.


Logical Architecture
Client Workstations
Firewall
Primary Load Balancer Node
Secondary Balancer Node
DMZ
Firewall
Node 1
Primary Cluster
Web Server
Websphere Application Server
TMSV2 App
Buy Site
Auction
Market Site
Web Application Server
Admin Server
Node 2
Secondary Cluster
Web Server
Websphere Application Server
TMSV2 App
Buy Site
Auction
Market Site
Web Application Server
Firewall
Primary Cluster
Relational Database Management System
SQL Database Server
Cluster Fail Over
Backup Server
Secondary Cluster
Relational Database Management System
SQL Database Server
SQL Application Database
Common Storage on SAN

Application Architecture



Business Model

The GoAP has considered the following three alternative business models for implementation of e-procurement.

i) Government owned–government operated
ii) Government owned–operated by a private operator
iii) PPP model (public private partnership)

The first two models were deferred as they involved risk of governmentinvestment on a new concept whose success is not assured. Government departments were apprehensive about the return on investments and possible criticism in case of failure of the system. The government has the domain expertise but does not have the best expertise in software development and in using information technology tools, whereas the private enterprise has both the technology and the requisite skill set to convert the manual processes into computerised processes. In view of the technology-intensive nature of the project, the PPP model is selected for obvious merits over the first two alternatives. In this model, the expenditure on hardware and software as well as its extensive customisation is borne upfront by the private partner without any investment by the government; all the risks related to changes in technologies are borne by the private partner. The private partner recovers the investments by way of transaction fee paid by the user departments for the transactions carried out on the platform.

Implementation

Since the project is the first of its kind in the country, the Government of Andhra Pradesh has engaged an internationally reputed consultant (M/s PwC – Price waterhouse Coopers) for assisting in drawing project requirements, developing the 'Request For Proposal' (RFP) document to select a vendor for implementation of this project. Only vendors with an existing e-procurement software or platform were considered for the project. Ground-up development of the exchange was avoided to expedite implementation and also to benefit from the experience that the vendor was expected to bring from earlier implementations of similar projects. A consortium, lead by M/s C1 India Pvt. Ltd. was selected as the private partner based on the competitive bidding to implement e-procurement across all government entities in the state of Andhra Pradesh under the PPP model. M/s C1 India Pvt. Ltd. carried out the design, customisation and implementation of the e-procurement solution as per the requirements of the GoAP. The private partner has put in place the required hardware, networking and communications equipment to operate the marketplace by investing upfront in the project.

Phased Implementation

Though the ultimate objective of the initiative is to have a government-wide e-procurement solution, considering the complexities involved, the Government of Andhra Pradesh (GoAP) planned to approach it in a phased manner. The solution has been implemented in three phases.

Phase 1: Pilot

A pilot in four selected departments was launched in January 2003 to test proof the concept in varied departments representing the whole spectrum of government procurements and then roll- out to other departments. The departments selected for pilot are the works departments, AP Technological Services dealing in hardware and software procurement, AP State Road Transport Corporation dealing in auto spares, fuels etc, AP Health & Medical Infrastructure Corporation dealing in drugs, medical equipment etc. The pilot was also meant to create templates for various types of procurement practices prevalent in government departments over a period of 9 months to set the stage for out across the government. In order to effect gradual transition from conventional tender system to e-procurement, the GoAP has issued executive orders and made e-procurement mandatory in the pilot departments for all procurements exceeding a value of Rs 10 millions in the first instance. This threshold limit was subsequently lowered to Rs 1 million by the end of the pilot phase.

Phase 2: Roll-Out

On the successful completion of the pilot phase, e-procurement was quickly rolled out (July 2004) to other departments for all works procurements costing above Rs 1 million and goods/services procurement costing above Rs 0.5 million. The roll-out is phased over a period of three years to cover all government departments at a mutually agreed schedule. E-procurement is presently being implemented in 16 government departments, 22 public sector corporations, 89 municipalities and 5 autonomous institutions. Till the end of March 2007, 29,400 tenders aggregating to Rs 45138 crores (US $ 10 billions) have been processed through the online eprocurement platform.

Phase 3: Operations & On-Going Maintenance

This phase envisages providing value-added services such as electronic payment, credit rating, logistics and co-branded Procurement Cards for bidder empowerment.

Revenue Model to the Private Partner

The GoAP has chosen a revenue model for the pilot, wherein the government departments would pay a fixed hosting fee and transaction fee at a suitable percentage charge on the transaction value to the private partner. However, in the roll-out phase, the onus of paying the transaction fee was transferred to every participating bidder at the rates fixed by the government. The transaction fee payable by a bidder is so evolved that it is either lesser or on par with the cost of tender documents charged from the bidders in the manual tender system. The revised revenue model has encouraged the departments and PSUs to participate in the portal as the departments are no more required to incur any expenditure for availing the e-procurement services.

Security and Authentication

The stakeholders have to be effectively convinced beyond any doubt that the transactions on the platform are secure. The identity of bidders participating and their quotations are very sensitive information in the entire tendering process. The e-procurement solution incorporated extensive security features to help ensure that all activities are logged, no unauthorised person has any access to the data, and all sensitive data is stored in an encrypted form in the data base and that the system can be restored in a minimal time in case of a disaster or system crash. A sound security policy for e-procurement on the following lines is implemented to ensure security in the platform.

- Two-factor authentication
- Digital signatures in compliance to the IT Act 2000
- Bid encryption at the data base
- Online antivirus scanning
- 128 bit SSL encryption
- Audit trail of each activity
- Privilege-based user access
- Facility for digital notarisation and time stamping
- Firewall for screening system access
- Access control system
- Intrusion detection system (network and host)
- Periodical third party security audit of system

Change management

Change management with stakeholders is very critical to the success of the e-procurement project. Setting up an e-procurement exchange was not a

big technological feat but to make the stakeholders adopt the platform was a big challenge. The implementation needed enormous efforts in change management. The stakeholders were slow to adapt to the change during the initial period and the project leaped up once the users were comfortable with the new system. The various steps that were taken to rope in the stakeholders are enumerated below.

Steering Committee: To ensure buy-in of the top management and to resolve procedural issues, a Steering Committee chaired by the Chief Secretary of GoAP, with the secretaries and heads of the 5 identified departments, IT&C Department and C1 India (private partner) as members was constituted. The Steering Committee necessarily met once every month during the pilot stage to discuss all issues arising in the implementation of the project and take quick and timely decisions to ensure all bottlenecks are removed.

Core Committees: Project owners or project managers were identified from within each department and core groups were formed in the user departments to chalk out the required implementation strategies within the departments.

Project Champions: Key officials from the target departments, PSUs (public sector undertakings) are trained as Chief Information Officers (CIO) by IIM Ahmedabad to steer the e-governance projects initiated by GoAP. The CIO's of all the departments where e-procurement solution is implemented worked closely with the Project Manger, GoAP (*who is also incidentally a trained CIO)* and C1 India project team. The CIOs have functioned as a bridge between the domain experts and the technology experts i.e., vendors. The CIOs would assist the Steering Committee in bringing in necessary legislative and regulatory changes, supplier adoption and streamlining the government procurement process. The CIOs have acted as project champions within their department to conduct change management process and to drive the project.

Stakeholder Involvement: Detailed 'As-Is' and 'To-Be' process studies were carried out duly involving the important stakeholders i.e., the department users and the suppliers/contractors. Feedback was taken from the Contractors Association of Andhra Pradesh on the processes. The gaps thrown by the 'To-Be' process study were filled by appropriate customisations and the agreed upon process by the stakeholders were mapped on the software.

Trainings – workshops: To effectively communicate the objectives and benefits of the project, extensive concept selling and training workshops were conducted for both the departmental users as well as the suppliers. At least 400 departmental users and 1000 suppliers were given hands-on training till date. The above-mentioned workshops also served as good forums to receive user feedback on the application. This feedback was always analysed and appropriate changes made in the process or the application including even a small a thing as labelling a particular data field in a language which is familiar to the stakeholders.

Help Desk services: A call centre type help desk was established to record and address all the issues of the participants. Detailed training kits and FAQs were prepared and made available to all the participants. The availability of literally round-the-clock help desk service has helped in increasing the confidence levels among all users.

Business Process Reengineering

Major re-engineering thas been carried out to re-design the bid submission forms so that the bidder submits the data online against a set qualification criteria, thus allowing the software to technically and commercially evaluate the bids. As soon as the bids are opened online at the stipulated date, the system assesses the responsiveness of the bids submitted by the bidders by comparing the data submitted by the bidder in the online forms vis-a-vis the set qualification criteria for the tender and provides the evaluator a system-generated bid evaluation statement of all participating bidders. The auto-bid evaluation has streamlined the bid evaluation process, made it faster and simple apart from making it less subjective. The departments are comfortable with the value-addition provided by the IT system.

Benefits of the eProcurement initiative

Transparency

In an e-procurement system the tender documents were hosted in the web site for downloading free of cost from the day of publication of tenders. This has eliminated bidders' dependence on department officials for issue of tender documents. Availability of information online to the bidders has eliminated human interface with department officials in pre- and post-tendering activities and this in fact has significantly contributed to reduce subjectivity and corruption in the procurement process. Information on the transactions, the status of evaluation and award of contracts is automatically made available to the bidders on the portal. Transparency in the procurement processes has improved the government image and has sharply reduced instances of adverse media reports related to flaws in procurement processes.

Reduced tender cycle time

Automated work flows and simplification of processes have improved the internal efficiency of procurement departments and significantly reduced the tender lead time from 120–180 days in the conventional mode to 36 days in the e-procurement mode. Reduction of lead time has contributed

significantly to early completion of projects and reduction of cost overheads to departments as well as to the suppliers.

Savings in Taxpayer's Money

The citizen is satisfied that the taxpayer's money is being spent wisely. In the first year of implementation i.e., 2003–04, the departments reaped significant cost savings amounting to Rs 255 crores (20% reduction in cost) for the procurement transactions processed on the e-procurement platform due to the competitive environment created. The cost savings are calculated as the difference between the estimated cost of procurement and the contract award value. This cost savings have stabilised to around 8% of the transacted value over the years. The overall cost savings from the operations are estimated to be around Rs 2,800 crores during last four years. Besides, the government departments have also saved considerable amounts (Rs 3–4 crores per year) on advertisement costs in the print media as e-procurement tender notices are substantially shortened over the conventional mode to contain only basic information on the name of work, estimated costs and the URL of e-procurement site for further details.

Empowerment of Bidders

Earlier, the suppliers had to physically go through several newspapers to keep track of tenders called by the various departments. The e-procurement exchange makes available all the procurement requests emanating from various departments to the suppliers at one source free of cost. Now, the suppliers are able to participate effortlessly in the government's bids round-the-clock, remotely, by sitting conveniently in their offices at largely reduced cost of transaction.

Elimination of Contractors Cartels

The electronic tendering process has been made completely anonymous. Only after the opening of bids by the departments on the pre-specified date and time, does anyone come to know the names of the participating bidders. This has prevented the suppliers from forming cartels and facilitated wider participation from genuine suppliers. Elimination of supplier syndicates/cartels ensured a level playing field to the suppliers and in this way, the genuine supplier is benefited by way of getting more opportunities. The government departments also have got the best value for the taxpayer's money due to competitive environment created by e-procurement.

Streamlining of processes

At the outset, an effort was made to standardise the procurement processes and bid forms across various works departments. Today, all the de-

partments/PSUs/urban local bodies dealing in procurement of works follow a common tendering process and bid forms for works tenders. The manual processes are being re-engineered to further improve the efficiency and curtail subjectivity in tender evaluation by the departments.

Management information system

The e-procurement platform provides a cross-section of management information system reports. This has improved the availability of information to the government departments for monitoring and reviewing the public procurements. Earlier collection of information related to status of procurements from various procurement entities spread across the state was time-consuming and the integrity of data collected was doubtful. Now the e-procurement system provides real-time MIS reports to the senior bureaucrats in the government instantaneously at the click of the mouse. The public representatives, citizens are given access to the information related to government procurements.

Future Plans

The e-procurement project is going to be an ongoing project of GoAP. The software is being continuously upgraded to suit the changes in government and legal requirements. Besides, the technology architecture is also updated to match latest developments so that the platform does not become obsolete at any point of time down the lane. The IT&C Department of the Government of Andhra Pradesh has drawn the future road map of this project to deliver the following value-added services.

Contractors' Data base Information system module to cut down tender lead time drastically

The procurement departments spend lot of time and resources in verifying the veracity of experience certificates produced by the contractors in support of the qualification criteria set in the tender documents. As this manual process causes delay, it has been envisaged to develop an information system to maintain a validated data base of all contractors with key details like experience particulars, financial turnover, availability of equipment etc with facility to update the data online either by the suppliers themselves or by the executing departments. This information system module would reduce the tender evaluation time to as less as 2 to 3 days and brings in objectivity to the whole procurement process..

Total procurements through the portal

The GoAP has issued executive orders making e-procurement mandatory for procurements of works of value exceeding Rs 1 million and procurement of goods costing above Rs 0.5 million for all government departments/PSUs/local governments. It is envisaged to make all procurements, irrespective of value, of government departments, through the portal, once the connectivity to rural areas is improved through the ongoing Broadband Project in Andhra Pradesh.

e-payments to suppliers

It is envisaged to develop functionality to monitor the supplies of goods, progress of projects, generation of bills, and online payments to contractors/suppliers for the supplies made by them, by integrating the portal with electronic payment gateways.

Self Service Zones for Suppliers

Eventually the portal would provide self-service zone facility to all registered suppliers on the portal. The suppliers would be able to procure their requirements of materials and employ sub-contractors to fulfill government contracts through this portal.

Awards and Recognition

The e-procurement project has been rated as the best e-governance project in the country winning the Golden Icon Award of the Government of India, Department of Administrative Reforms in 2003 and was recipient of the PC Quest Award for the best e-governance project in the country with maximum social impact in 2005. In a nation-wide assessment of 39 e-governance projects commissioned by the Ministry of IT, Govt. of India in 2006, e-procurement scored the maximum points (84%) and was rated the best. The project was also nominated for the Prime Minster's Excellence Awards 2006 and was a finalist.

Conclusion

The e-procurement project of GoAP, which cuts across the geographical boundaries of the state, and traverse along multiple departments, has been implemented successfully. The implementation was instrumental in reducing cartel formations amongst contractors and suppliers since all the bidding is done online through the portal. It has actually increased the par-

ticipation from the supplier community since anybody can bid for a tender remotely through the internet. The new system has considerably empowered the small and medium-sized suppliers. Efforts are now being made by the government to broaden the existing e-procurement functionality so as to include supplier performance measurement, sourcing collaboration, contract management and process and commodity specific templates. Demand aggregation and centralised tender inviting policy, which are the project's special features, are contributing to enhancement in the buying power of the government, leading to better discounts in the estimated cost of the tenders. Departments are able to get goods at the best possible prices, and are thus able to minimise the costs associated with inventory management. The user departments are benefited by cost savings to a tune of 8–12% on account of competition among the suppliers bidding for the government contracts and time-saving of more than 70% compared to conventional tender process. The e-procurement platform has introduced innovative sourcing practices like e-auctions and e-reverse auctions for getting better deals. The centralised platform provided information to the vendors about the procurement opportunities across all government departments, prompting them to participate in more biddings.

Implementation of e-procurement solution has increased transparency in the system, allowing for better monitoring and control over the procurement function in general, which was a weak link in the conventional system. The citizen is also satisfied that the tender process is done fairly and efficiently, and that the taxes they pay, are being spent wisely. The e-procurement software is continuously upgraded to suit the changes in government and legal requirements. Besides, even the technology architecture is updated regularly so that the platform is not subjected to obsolescence at any point of time.