Adoption of Enterprise Applications Towards E-Government – A Select Case Study of Municipal Corporation of Greater Mumbai

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ABSTRACT

Enterprise Applications in Public Sector and Government is fast emerging in India. While Public Sector has seen an earlier and faster adoption, Government organizations are also keenly evaluating and, to some extent, adopting this paradigm. This paper describes the choice, analysis, decision, implementation and benefits of enterprise applications at MCGM. The objective of this Paper is to provide insights into the paradigm of enterprise applications for E-Government and reaffirm that this is a notable, feasible, and perhaps an efficient phenomenon towards IT systems in Government.

Keywords: Enterprise Applications; ERP; SCM; CRM Information Systems in Public Sector; E-Governance; E-Government; Citizen Services

1. Introduction

Adoption of Enterprise Applications (ERP, SCM, CRM etc.) in the Public Sector in India has now got established, particularly in the PSUs/PSEs, and to some extent in the Government Organizations at the Central, State and Local Bodies levels. As these adoptions continue to happen, it is important that the "Value" derived from such implementations are understood and documented for the benefit of like Organizations willing to take this route for implementation of information systems in Government. This can happen only if some of the iconic cases are analyzed for their choice and implementation of Enterprise Applications. In addition, since implementations of Enterprise Applications are also expected to benefit Organizations by providing Best Practices for their various Processes, an analysis of relevant cases could well result in the development of a new paradigm towards information systems in Government, whilst, at the same time, ensuring that the lessons from such cases are well reckoned to avoid any pitfalls and reduced chances for success.

It is in this context that this Paper tries to delve deep into the choice, procurement and implementation of Enterprise Applications at the Municipal Corporation of Greater Mumbai (MCGM) – the largest municipal corporation in the country with an annual revenue budget of approx Rs. 12,000 Crores, well above some of the States' budgets. It is expected that the MCGM Case Study will benefit:

- several large municipal corporations across the country to understand the end-to-end process for adoption of Enterprise Applications and its Value,

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- the policy makers to consider and provide an alternative/complimentary paradigm for information systems in Government towards E-Governance not only in Municipalities (particularly the ones being pursued under JNNURM) but also other Mission Mode Projects (MMPs) under the National E-Governance Plan (NEGP)
- other Government and Public Sector Organizations who are "sitting on the fence" or actively considering adoption of Enterprise Applications

2. Theoretical Background

Academic literature on both fronts (of course, separately)–E-Governance as well as Enterprise Applications – have increased significantly over last few years. However, literature on adoption and implementation of enterprise applications/systems for E-Governance (intersection of the two areas), particularly in the Indian context, is sporadic and limited. Augmentation of this domain will have a significant use in decision making process for E-Governance, both for the customers (Government) and the vendors (ERP providers and implementers). It is this domain of literature that this paper tries to add to in the limited context of a specific implementation, albeit one of the largest ones having the potential to provide a directional paradigm for E-Governance. A brief and relevant literature survey, that follows, will help provide a context to the domain of knowledge addressed through this Paper.

IT/IS in Public Sector and E-Governance

E-Government Definition: In Hernon, Reylea, Dugan, and Cheverie (2002), e-government is defined as a technology, particularly the Internet, which is used to enhance the access to and delivery of governmental information and services to citizens, businesses, government employees, and other agencies. A broader definition is given in Gil-Garcia and Pardo (2005), where e-government has been conceptualized as the intensive use of information technologies for the provision of public services, the improvement of managerial effectiveness and the promotion of democratic values and mechanisms. In Beynon-Davies (2005), the term e-government denotes the use of information and communications technology (ICT) to change the structures and processes of government organizations. This is also the way e-government is seen by the author and the way it is understood for the purposes of this Paper.

E-Government Researches: According to Scholl (2004), the complex relationship between information technology and government has become a major focus of academic research in several fields such as public administration, organizational behavior, information science, and technology innovation. Thus, researchers who have chosen e-Government as a problem domain might have their theoretical starting points in several other disciplines. Thus there are different approaches depending on the starting point and chosen problem domain.

Given the context above, Ulrica Lofstedt (2005) gives a rough approximation of some of the current research in the field of e-Government and how different aspects and some researchers in the field are connected to each other. He mentions the areas of Management and Organization; E-Services; E-Security; E-Democracy; and Interactions. Also, Case Studies have been a key mechanism to bring forth the knowledge in this domain as can be noted from some noteworthy researches such as Torres, Pina, and Acerete (2005), Beynon-Davies (2005), Gupta and Jana (2003), Joia (2004), Liang, Xue, Byrd, and Rainer (2004), and Smith (2001).

For this Paper, Enterprise Systems, discussed through a Case Study, form the key underpinnings.

Enterprise Applications in Public Sector

As public sector and governments work to transform their environments from an internal resource optimization to a process integration and external collaboration focus, Enterprise Applications stand at the

forefront of solutions that will achieve this goal. Enterprise Application is expected to significantly increase efficiency, improve information access, reduce total cost of ownership, and help public sector and government achieve the highest levels of accountability and constituent service. For the past several decades, we have seen organizations on a global scale continue to streamline their business processes enabled by enterprise resource planning (ERP) systems. Despite the downturn in the global economy, there has been a growing trend of new ERP implementations in the public sector around the world. As a result the public sector has emerged as a key initiative for the top ERP vendors and consulting partners alike, with some having established new divisions dedicated to the public sector. These vendors are primarily targeting public sector and government agencies including Federal, State, and Local/Municipal Governments (Wagner et al. 2004; Makulowich, 1999).

Earlier, most of the public sector implementations have been on a small-scale, focusing on a few ERP modules within a department or agency. These small scale ERP implementations have been attempted in various governmental agencies in Australia, Germany, and the US (Chang et. al., 2000; Watson et. al, 2003; Boyer 2001). However, lately, there have been attempts to integrate several agencies of one public sector organization into one single ERP package (SAP INFO May / June 2007). The scale of these public sector projects can be immense as evidenced by the \$3B US Navy's ERP implementation and the US Army ERP implementation of over 135,000 end users (ProcessWorld 2003 presentation). Several government agencies implementing ERP projects, such as in the US, Germany, Australia, and Malaysia, have reported that the integration of agencies and systems in the public sector can be quite different from the private sector, requiring the use of a different approach and model. While comparing ERP implementations between the public and private sectors, there are several areas indicated in the literature that appear to be different (Blick et al., 2000, Sjoquist and LeBel, 2002). These include Culture, Organization Structure, complexity of political system and fragmented power system, funding source differences, process and country differences etc.

Implementation of ERP systems, and the consequent life cycle issues, provide the rationale for several studies, but very few deal specifically with major ERP life cycle implementation, management and support issues in the context of the public sector (this need is espoused in Gable 1998; Gable et al. 1998, 1997). This Paper, in a limited context, contributes here.

Business Process Change, E-Government and Enterprise Applications
Enterprise Applications have the potential to improve information management and the quality of governmental services. However, to take full advantages of IT, it requires organizations to understand and to overcome several challenges. Technological complexity and incompatibility are neither the only, nor the most difficult challenges to overcome. One of the major challenges is to develop credible business processes for enterprise information management (Williams, Scifleet, & Hardy, 2006). Only a few papers deal with the necessary changes in business processes, organizational structures, and information system (IS) inside governmental institutions that have to be performed in order for e-governmental initiatives to be truly successful. In Andrea Di Maio (2001), the progression of the activities in an e-services introduction project should be: first inside processes and then activities in which customers take part. Similarly in Beynon-Davies (2005) opinion, e-government implementation is not just a technological but also organizational change. It particularly demands a greater customer oriented focus from government agencies and is clearly tied to performance improvement. The paper also reports of the lack of clear case material, which describes the potentialities and pitfalls experienced by organizations grappling with this change. The root of the problems to be solved in introducing E-Governance has moved from the technological into the information and process management domain (Mutula & van Brakel, 2006). Therefore, the business process change methods should be used in the framework of E-Governance introduction. It is in this context, that the Case Study on implementation of enterprise applications at MCGM is particularly relevant.

3. MCGM Case Study

This case study is about the choice, procurement, implementation and benefits of SAP Enterprise Application deployment at MCGM. The information and analysis contained herein is primarily based on:

- Actual participation of the author in the RFP process as well as overseeing of the implementation progress on behalf of his Organization(s), and
- Interviews and discussions with the SAP Relationship Manager; key officials of the implementing Organizations viz., Siemens Information Systems Ltd (SISL) and ABM Knowledgeware Ltd; and officials from MCGM. In particular, inputs from Mr. Prakash Rane, MD of ABM Knowledgeware, Mr. Shekhar Sabnis, Project Manager from SISL, and Mr. Govind Chauhan, ABM were extremely useful.

About MCGM

The transformation of Mumbai from a group of islands to a financial and cultural megapolis has seen it become the 'Urbs Prima in Indis'. The MCGM was formed in the year 1865 as Mumbai's civic body. The MCGM is veritably the 'cradle of local self-governance in India'. It embodies the principle of democracy of 'governance of the people, by the people and for the people'. Today, MCGM stands as the largest local government in Asia. Through the multifarious civic and recreational services that it provides, the MCGM has always been committed to improve the quality of life in Mumbai. The MCGM now looks forward to greater co-operation from the citizens to make Mumbai a better place. MCGM covers an area of over 437.71 Square Kilometers, catering to the civic needs of over 1.25 crore citizens. The Corporation operates an annual budgetary outlay of approximately Rs. 12000 Crores and has approximately 1.2 Lakh employees. Most of the functions carried out by this Corporation are service oriented. The services offered include Sanitation, Health (Public Healthcare and Secondary Healthcare services through its Hospitals, Maternity and Child Health units, Polyclinics, Dispensaries and Field services), Community Services, Nursery & Primary Education and Town Planning, etc. There are 24 wards (with over 500 medium and small offices) across Mumbai through which over 260 services are rendered to the citizens. There are 34 departments functioning in tandem to ensure the services to the citizens.

MCGM Functions

MCGM is an Urban Local Body (ULB) and essentially provides civic services for the benefit of its citizens apart from being a regulatory organization for property and other taxes, and several permissions and licenses. The key functions of MCGM are summarized in Figure 1 below:

Enterprise Applications Project at MCGM

The objective of the project is to provide efficient service to citizens, administrators and corporators by implementing IT systems to enable MCGM's processes and workflows. Better IT systems were required to integrate all the workflows/processes seamlessly for a faster and efficient service to the citizens, employees, administrators and corporators.

A key requirement during the implementation of the systems is that they must all be tightly and seamlessly integrated such that:

- Any item of data needs to be entered only once and is then made available as often as necessary to all the systems that need to use it,
- Disparate information can be consolidated from a number of systems as required to produce reports and carry out ad hoc analysis and reporting;
- Single sign-on for all elements of all systems that can be accessed - subject to authorization - from any single user workstation, and
- Service Oriented Architecture is available wherein all systems can be orchestrated into a business process by exposing applications as web services.
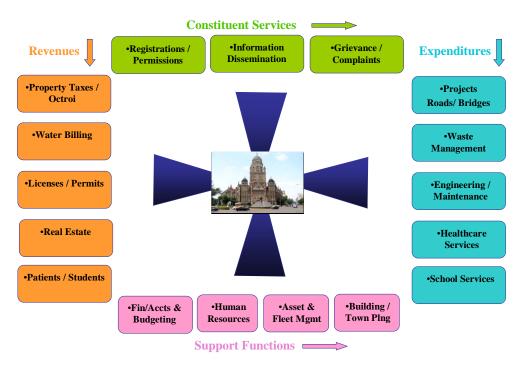
Figure 1: MCGM Functions

The implementation of the business solution is for the following functionality:

- Finance and Accounts
- Human Resources/Employee Self Services
- Materials Management (which includes procurement, inventory and stores)
- Fleet and workshop Management
- Citizen's Portal with Ward Management
- Project Systems
- Real Estate Management

In order to achieve the above, the following are imperative:

- Commercial-Off-The-Shelf (COTS) Solution
- Customizations (Blue Prints/Workflows)
- Services components (one time + recurring)
- Enhances and Bug fixes
- Training
- Post Implementation services, which include onsite and online Help needed to institutionalize the solution, as well as system support helpdesk.

As it was imperative to complete the assignment (accomplishing the implementation, all acceptance tests, Training, Parallel and independent runs and Data Migration) as per the schedule given and go live in one financial year, MCGM offered to:

- Collect all data required for the modules listed above and keep it ready in digital form prior to commencement of the parallel runs; and
- Adopt the practices best suited to MCGM's operations (as proposed by the Bidder as a part of the Business Solution) rather than modify the ERP system proposed by the Bidder.

Choice of Enterprise Applications at MCGM

Given the Objectives of MCGM for the modernization of the IT Systems, it was fairly evident that Enterprise Applications was the best route to pursue. Nonetheless, in year 2003 they appointed Tata Consultancy Services (TCS) as their Consultants to study their processes and existing systems and make suitable recommendations and provide a clear IT Roadmap.

TCS carried out an MCGM-wide study and recommended adoption of Enterprise Applications pursuant to a due government procurement process for such applications. RFP Documents[25] were prepared and issued towards the end of 2005 by the Consultants along with a committee of MCGM employees duly constituted for this purpose. Since the quality of Applications and Services was paramount, technical performance in the Bid was given a weight of 75% versus a Commercial weight of 25%. The overall scoring for the Bidders was based on the evaluation parameters shown in Table 1.

Table 1: Evaluation Criteria for selection of Enterprise Applications at MCGM

Criteria	Sub Criteria	Weightage
Business Solution	Business Functionality of the Solution	
	a. Best Practices	35%
	b. Best Fit to compliance matrix	
	Technological attributes of the Package	
	a. Tools	5%
	b. External Interfaces	5%
	c. Presentation	5%
	d. Technology	5%
	e. Risks	5%
People		10%
Bidders' Competence		5%
Cost		25%
Total		**100%**

At the end of the due process and evaluation, a consortium of Siemens Information Systems Ltd (SISL), ABM Knowledgeware Ltd, and SAP India Pvt Ltd was selected for providing the SAP Enterprise Applications portfolio and turnkey services to MCGM as per the scope of the RFP and a legal contract was finalized in April 2006.

SAP Deployment at MCGM

The status in early 2006 consisted of front end based automation of all wards with 3-4 legacy systems in place. However, this did not have any semblance of an integrated and MCGM-wide and citizen-centric deployment. As discussed earlier, the Enterprise Approach was adopted in April 2006. The scope of SAP implementation included Finance (FICO), Project System, Materials Management /E-procurement, Human Resource Management, Fleet Management, Real Estate, Citizen portal/Ward Management, and Integration with legacy systems.

The implementation commenced under the able guidance of Shrikant Singh, Additional Municipal Commissioner of MCGM. As of June 2007, large parts of implementation were carried out and the deployment status can be summarized as shown in Figure 2 below.

The Project started in May 2006 with a team of approximately 25 consultants – module leads plus 2 to 3 consultants for each of the 7 modules for core ERP. This team grew to a size of 50 by July 2006. This team reached a peak size of approximately 100 consultants by October 2006. Simultaneously, a team of about 25 consultants worked on the Citizen Portal and Ward Management (CPWM) applications from July 2006. The implementation followed the typical methodology as shown in Figure 3.
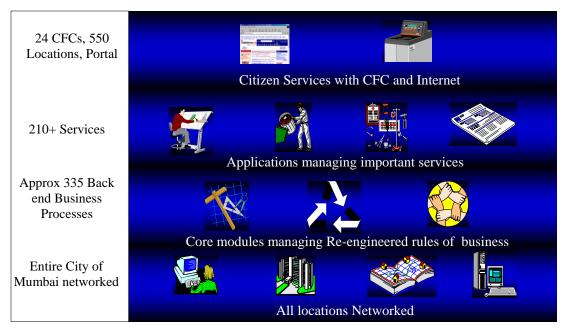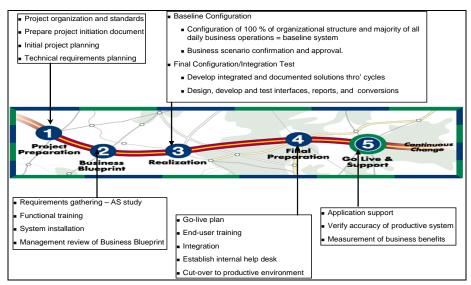
24 CFCs, 550 Locations, Portal	Citizen Services with CFC and Internet
210+ Services	Applications managing important services
Approx 335 Back end Business Processes	Core modules managing Re-engineered rules of business
Entire City of Mumbai networked	All locations Networked

Figure 2: SAP Deployment at MCGM – Status as of June 2007

Business Blueprint was completed by end of July and Final Preparation for Go-Live began in October 2006. CPWM roll-out was started in phases i.e. 24 wards were made live in batches of 3 - 5 Wards. By March 2007 CPWM was live in all wards. Core ERP Go-Live started in April 2007 again in modular phases. The gaps were identified in the Go-Live and were resolved during Apr-June, 2007. The significant and notable issue in this deployment is the network architecture that has been created for online functioning of the diverse and various units that needed to be connected up together for the deployment of MCGM-wide enterprise applications. Figure 4 below provides the high-level view of the Network Architecture that supports the deployment of enterprise applications at MCGM.

Figure 3: SAP Deployment at MCGM –Implementation Methodology

Figure 4: MCGM's Network Architecture supporting the Enterprise Applications

A few key challenges of this implementation have been:

- The standard ASAP methodology has been changed to suite the specific need of MCGM - there isn't a clear line separating each phase from preceding or succeeding phases.
- Go-Live - instead of being a milestone - became a phase.
- Full time availability of core team members has been a key challenge
- Since MCGM is a very mammoth organization, core teams in all cases do not have even representations from all departments.
- Data preparation has been a big challenge
- Limited Understanding of Municipal Accounts Manual.

Analysis of MCGM Implementation – Key Indicators and Benefits

Applications for Administrative Efficiencies
Some of the major benefits of implementation of SAP Enterprise Applications are being seen in the area of back-office functions of MCGM. Based on the study, the following key indicators were observed in this area:

Materials Management

- More than 1,500 Purchase Orders created
- Total value of POs more than INR 26 Crs
- Created by around 50 Departments/Sections

Project Systems
- Total more than 800 Projects created
- 13 User Departments and 24 Wards
- More than 900 Work Orders issued

Fleet Management
- Vehicle Allocation (to various user departments) started
- Maintenance Orders are being created
- Internal Labor planning and allocation is being done
- External Work Orders (for maintenance) also started

Accounting and Finance
- Financial transactions like Invoice Booking, Payments, JV entry started
- Accounting transactions are as per the Accrual Accounting norms of National Municipal Accounts Manual

Revamp of MCGM Portal
A major impact of the SAP implementation has been seen in the area of MCGM portal delivered through the Enterprise Portal component of SAP technology infrastructure. Some of the key benefits of this revamp are:
- On line availability of services to citizens through interactive forms
- Secured Payment Gateway for online payments
- Online registration of Complaints and its status monitoring including the escalations through backend workflows
- Single point of entry for SAP back-end as well as other system like Property tax, Water billing and Octroi
- E tendering process available through portals to prospective bidders

Citizen Services
With respect to Citizen Services, SAP trials began in February 2007 in all 24 Wards which started using SAP applications for giving about 100 Services. By July 2007, more than 210 services were implemented with an average of 2500 transactions per day, with over 2 Lac services in previous 3 months. Very soon, once the Ward operations stabilize, Citizen Portal would be opened for Public. Table 2 provides an indicative list of Citizen Services that are being transacted through the SAP enterprise applications.

One of the major achievements of the implementation of enterprise applications is the resultant reengineering of citizen services. The key highlights of this reengineering are:
- Services reengineered to reduce delivery time by 25-50%
- Minimized the employee discretions with high objectivity and reduced touch points for citizens
- Anytime, Anywhere availability of the services
- The online processes are tightly integrated to the back-end systems of ward management process through workflows

The key benefits to the citizens are in terms of:
- Citizen Services including Licenses, Registration, Approvals and Complaint management – Flexible access through multiple channels, Anytime – Anywhere access to services, Easier complaint reporting and tracking
- Payments & Receipts – Multiple modes of payment are supported

- Integration with legacy systems – Property tax, Water Billing, Octroi

Table 2: Indicative List of Citizen Services on Enterprise Applications at MCGM

SN	Citizen Service Category	No. of Services
1	Birth Certification Processes	6
2	Death Certification Processes	3
3	Health Services	6
4	MPFA Licenses	8
5	Shops & Establishments	6
6	Trade Licenses	8
7	Hoarding licenses	6
8	Advertisement - Other Licenses	6
9	Movable Advertisement Licenses	3
10	Projection and Stall Board Licenses	8
11	Complaints	1
12	Nursing Home and Sonography	6
13	Building and Factories	9
14	Gardens and Trees	5
15	Maintenance Services	13
16	Water Works	1
17	Markets- IN PROCESS	Under Implementation

A sample of benefits envisaged for the citizens on the "Services" due to adoption of enterprise applications, based on which the Service Level Agreements (SLAs) would be established, are shown below in Figure 5:
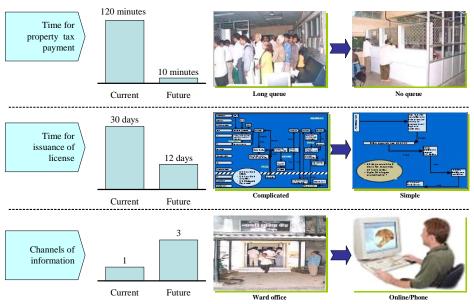

Figure 5: Citizen Services – Benefits envisaged

In a nutshell, the Citizen of Mumbai stands to benefit by more responsive services to citizens, Service delivery planned at doorstep of the citizen, and a planned Service availability of 24 * 7 * 365.

4. Concluding Remarks

This Paper is a limited investigation into the case of enterprise applications' implementation at MCGM. However, it does reveal that such an approach works for government organizations and can also prove to be efficient and fast in terms of deployment (considering a period of less than 1 year for such a mammoth organization), apart from bringing significant benefits in administrative and citizen service processes for the organization. A potential future research into the process of how "Value" can be created for government organizations by deploying "Enterprise Applications" will be an extremely useful addition to the domain of knowledge discussed in this Paper.

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