Geospatial and e-Governance Readiness Assessment: A Case Study from India and South Africa

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ABSTRACT

E-governance and Geospatial technology adoption in the context of service delivery of municipalities is meant to have transparent, efficient and responsive government. In this globalised world, the technology adoption and its application is emerging at a very rapid pace. However, world over municipalities are facing enormous challenges to have effective municipal service delivery with changing scale of cities and changing socio economic background state of its citizens. The prime objective to implement E-governance and Geospatial Technology is usually cost cutting and also minimizing the complexities of procedure by possible business process reengineering. Municipalities are entrusted to provide efficient service delivery to its citizens and subsequent technology adoption however they still have issues like digital divide, affordability etc. The municipalities are keeping abreast of latest technologies and implementing them to enable greater facilitation of its services and at the same time increasing the accessibility of its services to the citizens. The concomitant advantage could be empowering people through so called "disintermediation" or eliminating middleman between government and its citizen. Just to mention a small example, implementing online property tax assessment and collection system could eliminate element of corruption in form of "middleman" and also improve on service delivery or consumer convenience especially in developing countries. The paper discusses and evaluates the dimensions of e-Governance and Geospatial adoption at select municipalities in India and South Africa and their readiness level for further change. The scope of this Geospatial and e-Governance Adoption is kept within the context of GIS and web enabled services, which further leverage transparency, responsiveness and accountability. Based on this overview of Geospatial and e-Governance Adoption level study, the paper identifies the lessons learned from the qualitative analysis of the Geospatial and e-Governance adoption levels for strengthening the areas of planning, governance and service delivery services to the citizens.

1   Introduction

The Local government or municipalities world over are responsible to provide basic services to its citizen to satisfy their basic needs. However, The municipalities are often trapped in a vicious cycle of under resources and are economically stressed to facilitate the desired levels of services and infrastructure (Nel and Rogerson 2007). Often this system results in poor delivery of services, thus lowering of service level benchmarks. Depending on the municipal organizational structure, the municipalities have degrees of differences in terms of fiscal, spatial, functional, governance and technological capacities. Under the complex circumstances, measures like E-governance or application of Information and Communication Technology (ICT) and adoption of Geospatial technologies have given a ray of hope to enhance the service delivery to the citizens. "e-Government development very often aims to improve public service delivery capability, as well as public administration

governance, transparency, and accountability through the development of e-government service delivery capability" (Chatfield and Alhujran 2009).

Integration of ICT with spatial interface for services delivery, planning and development brings in the concept of 'Geospatial' aspects of e-Governance. In order to manage complex governance challenges, the combination of Geospatial and e-Governance forms one of the widely accepted solutions / interventions.

2   Need for E-Governance and Geospatial Governance

The need for e-Governance or Geospatial governance can be traced to the fact that municipalities world over adopted various approaches to achieve good urban governance. Most of the good urban governance at the municipal level is associated primarily with the adoption of ICT in the form of e-Governance initiatives. The technology adoption programs in municipalities have traditionally evolved from an urge to make municipalities perform better for delivery of services to citizens and achieving overall performance in its functions. Some key areas of implementation of technology based solutions can be property enhancement applications, complaint redressal system, registration and issue of trade licenses, birth and death registrations, provision of information to citizens through kiosks, websites, etc. These approaches are not always integrated with other modules within the system resulting in approaches being adopted at the municipal level being isolated from one another.

3   Geospatial and e-Governance Adoption levels

Geospatial technologies have matured in the last two decades, and City Planners have continued to adopt and adapt these technologies through higher education, increased access to datasets, and wider use of related technologies in agencies. However, mostly in developing countries, Geospatial technology is seldom utilized for advanced applications like modeling or spatial analysis, but rather is most often used to create inventories, access information, and perform simple mapping for reports and public meetings. The use of GIS in municipalities has not reached the level envisioned by scholars and proponents of GIS (Venture and Gocmen 2010). E-Governance functions at local level include multitude of services but not limited to planning, preparation and approval of mega-plans, management of existing infrastructure and restructuring of facilities. Around 80% - 90% of municipal / government data is geographic in nature - containing location information, area / extents, pin code, or latitude and longitude co-ordinates. The availability of spatial data using Geographic Information technology (GIT) has opened planners / decision makers to think beyond 'conventional' Decision Support System (DSS) / e-Governance System to the 'Geo-Spatial' System. As per e-Governance web measurement assessment in 2008, South Africa ranked 39 with an index of 0.55 and India ranked 54 with an index of 0.47, among the 192 member states of United Nations (United Nations 2008). However, these rankings are based at country level and do not reflect the clear picture at municipal level within the dimensions of planning, governance and service delivery. Not much research has been done on geospatial readiness in terms of various parameters linked to municipal governance, planning and service delivery at local level.

4   Municipal Case Studies: South Africa and India

The present paper discussed two case studies in form of comparative analysis on select parameters for Geospatial and E-governance Readiness. The case study is focused on two metropolitan municipalities namely Johannesburg in South Africa and Surat in India, which assesses local government web enabled GIS service delivery and its access to citizens. A qualitative approach of assessment was adopted by reviewing the extent of services provided through web enabled mode in areas of planning, governance and service delivery with focus on citizen centric interface. A comparative assessment of case municipalities provides an overview of level of Geospatial readiness in service delivery and access to citizens.

South Africa has 283 municipalities, categorized into three constitutional categories which include: Metropolitan municipalities -Category A; Local municipalities -Category B; and District municipalities - Category C (LGMS 1998) based on the Municipal Structures Act (LGMS), No.117, 1998. There are 6 metropolitan municipalities, 231 local municipalities and 46 district municipalities as categorized in three constitutional categories (COGTA 2009). The six metropolitan municipalities namely: City of Johannesburg, City of Cape Town, eThekwini (Durban) Metropolitan Municipality, City of Tshwane (Pretoria), Ekurhuleni Metropolitan Municipality, and Port Elizabeth represent the 32% of the population with rapid urbanization exceeding 4% per annum (Naude et al 2006). For the present paper, we have selected City of Johannesburg.

In India, as of 2001, there were 1363 Census Towns in the country and 3798 Statutory Towns making a total of 5161 urban centers which constituted 27.8% of the total population. As per 2001 census there were 35 metro cities in India which accounts for 38% of the total urban population (Census 2001). The metro-cities are those cities having population more than one million & above. "Metropolitan area means an area having a population of 1 million or more, comprised in one or more districts and consisting of two or more municipalities or Panchayats or other contiguous area, specified by the Governor by public notification to be Metropolitan area for the purposes of this Part" (Sivaramakrishnan and Maiti 2009). From India, Surat Municipal Corporation has been studied and compared with city of Johannesburg.

4.1   Case Study 1: Surat Municipal Corporation (SMC)

Gujarat is one of the 28 states of India, which makes four of its major cities as part of 35 metro cities of India, namely : Ahmedabad, Surat, Vadodara and Rajkot. As per 2001 census, the population of Surat was 2876374. Surat Municipal Corporation (SMC) carries out all the obligatory & discretionary functions prescribed as per the municipal act and bye laws. Some of the services include: education, basic civic facilities like water supply, drainage, solid waste management, town development, tax collection, amusement, etc. SMC has received many awards in various categories and e-Governance, is one of the category where the corporation has set examples of best practices in various categories of services which have both citizen as well as business interface (Surat Municipal Corporation 2011).

4.2   Case Study 2: City of Johannesburg (COJ)

City of Johannesburg Metropolitan Municipality in South Africa offers a multitude of services to its citizens. Some of these services are offered through its established entities/ fully owned companies. The services offered through the independent companies include: water supply, solid waste management, electricity, public transportation, etc. Besides these services, the municipality provides various services through its civic centers and customer care centers which include: accounts and payments, building plans, licenses, traffic fines, valuations, building plans etc. The Johannesburg Metropolitan area is divided into seven regions which comprises of dedicated civic centers, customer care centers and pay centers for providing services to the citizens (City of Johannesburg Metropolitan Municipality 2011).

5   Analysis of Geospatial and e-Governance Readiness

Over the years, there have been various models presented by United Nations(UN), Gartner Group, World Bank(WB) etc having varied stages and functionality levels of E-governance and Geospatial adoptions. These models have been used to analyze the Business to Business (B2B), Business to Government (B2G), Government to Government (G2G), Government to Business (G2B) or Government to Citizens (G2C) interface. In this context, a well organized and efficient model similar to United Nations five stage web-based public service delivery models is relevant to analyze service delivery stages. The following are the key stages of the model:

•   Elementary (L1) – Web presence: no or only static web presence

•   Medium (L2) – Enhanced web presence : detailed information with basic functionality

•   Good (L3) – Interactive web presence: interactivity connecting users and service providers.

•   Advanced (L4) – Transactional web presence: Secure transactions and communications between the citizens and government.

•   Futuristic (L5) – Seamless networked web presence: one-stop portal for citizens, the services and functions at any given time.
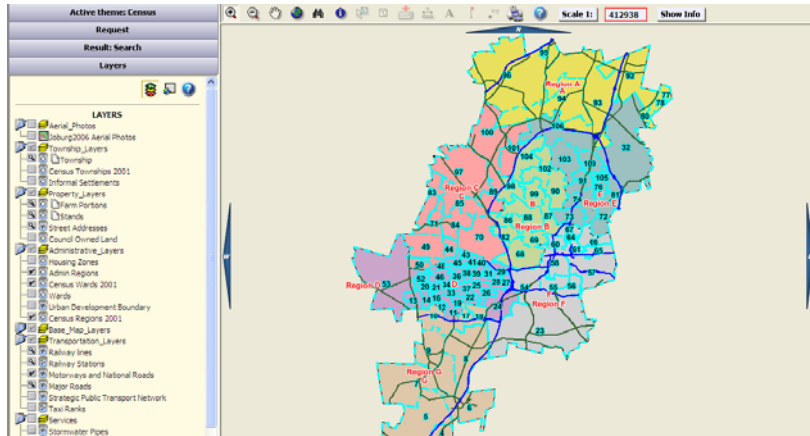
Figure 1: Web GIS layout / application from City of Johannesburg Metropolitan Municipality.
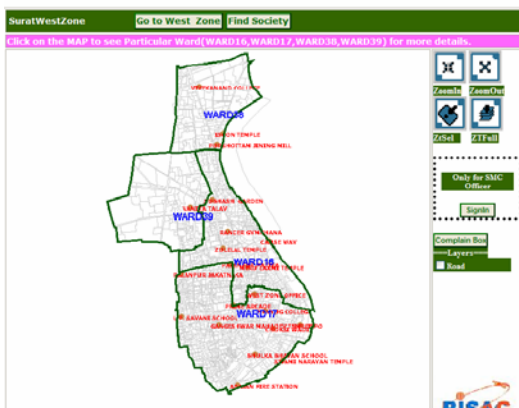

Figure 2: Web GIS layout from Surat Municipal Corporation.

The select municipalities in India and South Africa have been broadly studied on preparedness of e-Service delivery and GIS functionality /WebGIS services and also on efficiency of delivery of these services. Table. 1 outlines some of the key areas of E-governance and Geospatial implementation in both the municipalities.

Web Presence	Elementary (L1)		Medium (L2)		Good (L3)		Advanced (L4)		Futuristic (L5)	
Web based GIS Services and functionalities	Not Available		Informational		One Way Interaction		Two Way Interaction		Transaction	
	COJ	SMC	COJ	SMC	COJ	SMC	COJ	SMC	COJ	SMC
Water Supply										
Tariffs			x	x	x					
Payments		x	x							
New Connection			x	x						
Meter Readings		x	x				x			
GIS functionality	**X**	**X**								
Waste Management										
Tariffs		x	x		x					
Payments		x	x							
Bins		x	x		x					
GIS functionality	**X**	**X**								
Electricity										

Tariffs		x	x		x							
Payments		x	x									
New Connection		x	x									
Meter Readings		x	x		x		x					
Complaints		x	x				x					
GIS functionality	**X**	**X**										
Driving License		x	x		x							
GIS functionality	**X**	**X**										
Bus Services			x	x								
GIS functionality	**X**	**X**										
Building Plans			x		x	x	x					
GIS functionality				**X**			**X**					
Fines		x	x									
GIS functionality	**X**	**X**										
Street Lights	x					x						
GIS functionality	**X**	**X**										
Customer Care			x									x
GIS functionality	**X**	**X**										

Table 1. The symbol (x) inside the table represents the web based e-Services, and symbol (**X**) represents the Geospatial functionality.

In spite of various efforts and initiatives, many of the e-Governance programs/ projects do not realize its full potential due to the missing links. These missing links are none other but the missing links of spatial aspects of E-governance. The geospatial dimensions / Geographic dimensions of data are core to various spatial activities at local level. Traditionally GIS was used as a department specific function where mapping needs were forwarded to, in order to have an image created for publication or use in policy discussions. GIS has evolved from a function to a necessary component of policy creation (Morgan and LaFary 2009). It provides unparalleled power to examine social, economic and political circumstances. With the evolving of this technology, its usefulness / application becomes more prominent in the public sector, and thus to decision making (Haque 2001). The utilization of GIS technologies has been demonstrated for many applications in local government. Initial uses are typically limited to query and display applications. The application of more sophisticated analysis, modeling and prediction is limited primarily by organizational and institutional challenges (Venture 1995).

The key components of success at local government can be classified in form of three constituents (Lewis and Ogra 2010).

- Planning and Development: includes Building Approval, Land Parcel Management, Zoning & Development, Town Planning Schemes, Urban Renewal, Master Plan, Integrated Development Plans, City Development Plans, Spatial Plans, Structure Plans, Project Development and Management, Slum Development, Community Planning etc.

- Governance: include resource mobilization like property Tax System, Advertisement Management, Asset Management, employee management system, Complaint Management System, Traffic & Transportation/ fines, Park Management etc.

- Service delivery: includes Water Supply, Sewerage, Drainage, Solid Waste Management, Street Lighting, Streets & Roads etc. Keeping aligned with the concepts of Good Urban Governance, the dimensions of e-Governance at municipal level should primarily account / take into consideration such key areas with integration of GIS.

Table 2 provides the comparative analysis of e-Governance and Geospatial adoption levels reached in select two municipalities. The analysis is based on the structured qualitative analysis on select dimensions within the planning, governance and service delivery aspects based on WebGIS / e-Governance online access to citizens.

Sr. No.	Select Metropolitan Cities	Dimension	Key Aspects	Type of Dimension	Geospatial and e-Governance Readiness Levels				
1	**South Africa**				L1	L2	L3	L4	L5
	Johannesburg	Planning	Building Plan Approval	e-Governance				x	
	Population			Geospatial				X	
	3479723	Governance	Customer Care	e-Governance		x			
				Geospatial	X				
		Service Delivery	Water Supply (W/s)	e-Governance			x		
				Geospatial	X				
2	**India**				L1	L2	L3	L4	L5
	Surat	Planning	Building Plan Approval	e-Governance			x		
	Population			Geospatial		X			
	2876374	Governance	Customer Care	e-Governance					x
				Geospatial	X				
		Service Delivery	W/s - Tariffs	e-Governance		x			
				Geospatial	X				

Table 2. Comparative analysis of extent of Geospatial and e-Governance readiness assessment on dimensions of planning, governance and service delivery.

6   General Observations

The analysis of the select metropolitan municipalities from South Africa and India clearly shows the varied E-governance and Geospatial adoption levels while considering different dimensions of planning, governance and service delivery areas. The benefits of e-Governance and Geospatial adoption are yet to be seen as fully percolated down to citizen level. It is evident that municipalities from the same region from both the countries are at various maturity levels. In case of Johannesburg, the adoption stage for building plan approval is reached as Level 4 and it is observed moderate in case of SMC. In case of cities like Johannesburg the model is based on Interactive Voice System (IVS) managed through customer care centres or dedicated call centres, where as in case of Surat the information provided the system matches all the stages of maturity level with an exception feature where citizens can track the status of complaints registered within the municipality.

The service delivery dimension of urban infrastructure services like water supply etc has been analyzed on various parameters. In case of South Africa, Johannesburg metropolitan municipality has reached the level 2 with dynamic interactivity in all the parameters like tariffs, payments, new connection, and meter readings. In case of India, the situation in the select case municipalities is different.

7   Lessons Learned

It is clearly evident from the case municipalities that level of E-governance services initiated across various citizen centric services are at various levels of maturity depending upon the type of service. The common E-governance service like water supply, electricity, building plans is largely seen at advanced stage across the case municipalities. However, the integration of geospatial services is still at nascent stage across all the major basic services to the citizens. In terms of geospatial related services, only building plan related services are seen largely at advanced level with City of Johannesburg. The case analysis of web based geospatial services clearly

provides a further scope of integrating citizen centric services through Web-GIS with access to common services like solid waste management, location based services, emergency services, social and other community asset information services. Besides access to citizen centric services, the municipalities can strengthen their decision making process by geospatial analysis across various services for better planning, governance and management.

The municipal context varies across regions and hence informs the adoption of integration of Geospatial and E-governance measures by the municipalities. The level difference of Geospatial and E-governance readiness level depicts the gaps of inter-operability within the dimensions of planning, governance and service delivery at municipal level. The maturity level gap also shows the future areas of improvements within the context of citizen centric, business and government interface. The gaps across the dimensions of planning, governance and service delivery across the municipalities can be bridged by integration of uniform E-governance measures and Geospatial adoption. The municipalities can replicate some of the measures depending on the E-governance maturity level reached, with an objective to enhance the multifunctional interface like: citizen centric, business and government interface.

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