Application of GIS For Revenue Collection and Management

Charles Mkalawa(PhD)
Ministry of Lands Housing and Human Settlements Development
The World Is Facing Many Challenges

Increasing
- Population
- Consumption
- Land Use Conflicts
- Pollution
- Health Needs

Declining
- Resources
- Diversity
- Natural Areas
- Security

... GIS Provides Many Solutions To Help
48% of World Population Lived in Urban Areas in 2003
(3 Billion People)

Source: World Bank
48% of World Population Lived in Urban Areas in 2003 (3 Billion People)

4.1 Billion People (55% of population) Will Live in Cities by 2020

Source: World Bank
As high as 40% of Tanzania population lived in the cities in 2012

Charles Mkalaawa 2014,
Un-Habitat 2014
Challenges for town planners:

- Housing
- Public utilities
  - water
  - power,
  - sewage,
  - solid waste management
- Transportation
- Healthcare
- Environment Protection
- Law enforcement
- Disaster Management
  - security
- and raising capital to fund the investment
Municipal Revenues sources

• **Exclusive taxes**
  property tax
  profession tax
  Entertainment tax
  Advertisement tax

• **Revenue –shared taxes**
  All taxes on goods and services levied by the state government

• **Non-tax revenue**
  User charges
  trade licensing fee
  FSI Charge /Betterment charge/impact fee/development charge
## Tanzania Tax Revenues

<table>
<thead>
<tr>
<th>Month</th>
<th>H2 2015</th>
<th>H2 2016</th>
<th>Increase</th>
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<tbody>
<tr>
<td>July</td>
<td>925,384.7</td>
<td>1,069,458.5</td>
<td>15.57%</td>
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<tr>
<td>August</td>
<td>923,316.9</td>
<td>1,154,222.5</td>
<td>25.01%</td>
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<tr>
<td>September</td>
<td>1,132,310.3</td>
<td>1,378,048.9</td>
<td>21.70%</td>
</tr>
<tr>
<td>October</td>
<td>1,037,179.8</td>
<td>1,131,094.9</td>
<td>9.05%</td>
</tr>
<tr>
<td>November</td>
<td>1,027,939.6</td>
<td>1,123,509.7</td>
<td>9.30%</td>
</tr>
<tr>
<td>December</td>
<td>1,403,189.8</td>
<td>1,414,921.8</td>
<td>0.84%</td>
</tr>
<tr>
<td>Total</td>
<td>6,449,321.1</td>
<td>7,271,256.26</td>
<td>12.74%</td>
</tr>
</tbody>
</table>

Source: Thirteenth Central Finance Commission.

Source: Tanzania Revenue Authority (TRA)
Property Tax not being realized in full potential

- Poor assessment rate
- Weak collection efficiency
- Need for better methods for property valuation
- Loss on account exemptions

- How to overcome those challenges
Dar es salaam city (Tanzania) GIS Solution for property tax management

• Objectives
• Check property tax collection and track tax evaders
• Migrate to unit value tax system
• Enhance quality of citizen services
• Improve efficiency transparency and accountability in their functioning
GIS can help in increasing property tax realization

- Link data visually on a common platform
- Easy, accurate collection of information
  - Covered area/Plot Area, Locality details, Width of facing roads etc
- Less field visit for complaint redressal and other assessment purpose
- Greater visibility through multiple dashboards
- Transparency and consistency in tax assessment
Municipal GIS Solution for Property Tax Management
Case of Kanpur Nagar Nigam

Approach
- Creation of a GIS based spatial property database
- Assessment data preparation using existing details and contact surveys
- Re-numbering of properties
- Applications for property database repository management and tax assessment
- Interactive web-GIS system for online property tax calculation and payment
GIS Implementation Process

1. Needs Assessment
2. GIS Requirements
3. Implementation Alternatives and Analysis
4. Pilot Project
5. Full Implementation
e-Government property Tax Management system – Overview

- Property Municipal Report
- Ward Reports
- Ward property types
- Defaults Reports

1. New property assessment
   - Assessment submission
   - Verification and approval
   - New property generation
   - Assessment notice

2. Transfer of ownership
   - Request for transfer
   - Verification and approval
   - Transfer document

3. Property mutation
   - Request for mutation
     1. Property modification
     2. Amalgamation
     3. Bifurcation
   - Revised demand calculation
   - Verification & approval
   - Deactivate property

4. Property notes
   - Demand notice
   - Objection
   - Warrant
   - Recovery attachment
   - Demand notice
   - Deactivate property

5. Collection
   - Tax payment
   - Update DCB
   - Generate receipt
   - Citizen view property
   - Pay online
   - Recovery attachment

Integration

- E-Government
  - Employee information system
- E-government
  - Financials
- E-Government
  - Collections
- Other collection devices / agencies (ATM)

GIS

- Street master
- Guidance master
- Property usage
- Property type
- Calculation rule setup
To be included

• EFD machine location
• Block management system(Business location)
GIS Property tax information system

• GIS enables property tax information system is internal portal that will provides comprehensive mapping of all properties within Dar es salaam boundary.

• System will be developed to establish a GIS based database along with specific applications and update facility relating to properties ,with wards and zone boundaries.

• It provides features to map tax-paying properties with unique PIDs (Property identifiers ) and associate update property tax collection details as layers of information on GIS map.

• The system become necessary to improve efficiency in assessing expected revenue collection ,information on defaulters ,comprehensive view of property usage ,properties not yet into tax net etc.
With an aim to establish participatory system, GEPTIS provides functionalities to citizens for viewing their properties on GIS Map.

Citizens are required to complete one-time registration to get access to the system and may view property details.

Optionally, citizens may submit feedback to TRA about corrections to mapping and about changes to property details with regard to usage such as commercial use vs. residential use.

GEPTIS Public view when is on beta version. TRA Officers will extensively review and update the system to make corrections where required. Most of the properties will be mapped to GIS Property tax information system. May be very less of data will be pending.
Citizen services

- Property tax
- Property tax information system
- Birth certificate
- Trade Licence
- Building approval
As first login in

- User has to register on the board room and enter name and mobile number, password and OTP Received.
After you log in
For Authorized Users Only

Login

Name / User Name: anil.patil
Password: ********
Location*: NMC
Counter*: Property Tax Online General Counter

Login Close

CAPS LOCK: ON
<table>
<thead>
<tr>
<th>Address/पत्ता</th>
<th>Indiranagar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khasra Number/कसरा कर्नक</td>
<td>23</td>
</tr>
<tr>
<td>City Survey Number/स्टाट भूमिगत कर्नक</td>
<td>588</td>
</tr>
<tr>
<td>Parcel Id/पर्ल्स आईडी</td>
<td>233</td>
</tr>
<tr>
<td>Exempted From Tax/करणाने निपटण</td>
<td></td>
</tr>
<tr>
<td>Reason for Tax Exemption/करणाने निपटणासाठी कारण</td>
<td>select</td>
</tr>
<tr>
<td>Is correspondence address different from property address?/पत्रांवरून पत्ता सावधान करणाचा निर्देशाचा असेल किंवा नासेल का ?</td>
<td></td>
</tr>
</tbody>
</table>

**Property Bound By/मालसर्विसी पहुंचिस्थित**

<table>
<thead>
<tr>
<th>Property Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>North/मध्य</td>
</tr>
<tr>
<td>East/पूर्व</td>
</tr>
</tbody>
</table>

**Property Type/मालसर्विसी प्रकार**

<table>
<thead>
<tr>
<th>Property Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>select</td>
</tr>
</tbody>
</table>

**Location Factor/स्थितीच्या गुणावधान**

| select |

**Usage/संस्थापन्न कार्य उपयोगातील केंद्रे प्रकार**

| select |

| Building cost/मकानाचे मूल्य | |
| Amenities/सुविधांचे संग्रह | |
| Open Plot Manual ALV/अपनं वेदना | |
### Is correspondence address different from property address?/ पता बदलने पर बालात्मक पता बदलने वेंकट आ०

<table>
<thead>
<tr>
<th>North/ उत्तर :</th>
<th>South/ दक्षिण :</th>
</tr>
</thead>
<tbody>
<tr>
<td>East/ पूर्व :</td>
<td>West/ पश्चिम :</td>
</tr>
</tbody>
</table>

### Property Bound By/ मालमतोत्री वयुःसिमा

<table>
<thead>
<tr>
<th>Property Type/ मालमतेच्या प्रकार * :</th>
<th>Residential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Category/ मालमतेच्या प्रकार * :</td>
<td>Residential House</td>
</tr>
<tr>
<td>Area of Plot (Sq. Mtrs.)/ मुख्यांच्या लॅंग्वेल (डे.मिटर) * :</td>
<td>50</td>
</tr>
<tr>
<td>Location Factor/ होळकर * :</td>
<td>A</td>
</tr>
<tr>
<td>Authorized property/ अधिकृत मालमता * :</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Notice to be Generated/ कङ्कालाचे वेतनी मंत्री *

- Notice 127
- Notice 134

### Floor Details: Enter the details of each floor/ मजल्याचे विवरण/प्रत्येक मजल्याचे विवरणाची मंत्र करा

<table>
<thead>
<tr>
<th>Unit Number/ गूढित क्रमांक *</th>
<th>Unit Type/ गूढित प्रकार *</th>
<th>Unit Category/ गूढित प्रकार *</th>
<th>Floor Number/ मजलेचा नंबर *</th>
<th>Type / प्रकार</th>
<th>Name of occupier/ वापरार्च्या नाव</th>
<th>Assessable Area, after deducting 15% (Sq.Mtr.)/ अनुशंसिक्य कर १५% नाप म्हणजेच १५ (डे.मिटर) म्हणजे पृष्ठ करण</th>
<th>Usage/ होळकर</th>
<th>General Water Rate/ जल प्राप्ती</th>
<th>Occupancy/ भवनाच्या भाग</th>
<th>Age of Assessment W.E.F. / वास्तविक वर्षाप्रमाणे (DD/MM/YYYY)/ दिव्यांगी-मान्यता (DD/MM/YYYY)</th>
<th>Structural factor(SF)/ संरचनाचे भाग</th>
<th>Rent (in Rs.)/ मास (रू.)</th>
<th>Length (in Sq. Mtr.)/ लंबाई (डे.मिटर)</th>
<th>Width (in Sq. Mtr.)/ वर्दळ (डे.मिटर)</th>
<th>Built up area upto first intercepting wall(in Sq. Mtr.)/ प्रथम विकंबाने किंवा फक्त मलकाचे होकरणे (डे.मिटर)</th>
</tr>
</thead>
</table>

### Add/ Delete/ संशोधन करे/ वसावे

Do you finish all changes

[ ]
<table>
<thead>
<tr>
<th>Property Tax</th>
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<tbody>
<tr>
<td><strong>Bill Number</strong></td>
</tr>
<tr>
<td><strong>Additional Information</strong></td>
</tr>
<tr>
<td><strong>Consumer Code</strong></td>
</tr>
<tr>
<td><strong>Payee Name and Description</strong></td>
</tr>
</tbody>
</table>

**Payment Details**

- **Total Amount To Be Received:** Rs. 22008.00
- **Total Amount Received:** Rs. 0.00

- **Mode of Payment:**
  - [ ] Cash
  - [X] Cheque/DD

- **DD/Cheque Number:** 337811
- **DD/Cheque Date:** 01/05/2013
- **Bank Name:** ICICI Bank
- **Branch Name:** Indiranagar
- **Amount:** 0.0

- **Paid By:** Saketh
- **Manual Receipt Number/Date Required:** [ ]
- **Manual Receipt Number:**
- **Manual Receipt Date:** (DD/MM/YYYY)

* Mandatory Fields
<table>
<thead>
<tr>
<th>Index Number/ इंडेक्स क्रमांक</th>
<th></th>
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<tbody>
<tr>
<td>003001</td>
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</tr>
<tr>
<td>003001962</td>
<td></td>
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<tr>
<td>003001982</td>
<td></td>
</tr>
</tbody>
</table>

* Mandatory Fields / अवश्यक रक्षित *
MERCHAND NAME
NAGPUR MUNICIPAL CORPORATION

TRANSACTION AMOUNT
Rs. 10000.00

Please select your internet bank and click on Make Payment below.

Select Bank
Please select your bank from the drop down list

Make Payment

Terms & Conditions | Privacy
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<table>
<thead>
<tr>
<th>Date</th>
<th>Sender</th>
<th>Task</th>
<th>Status</th>
<th>Details</th>
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<tbody>
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<td>Property Tax</td>
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<td>0020041141 - anil.patil</td>
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
Project Implementation Phases

**PHASE – I: Requirement Analysis**
- User Requirement Study
- System Design
  - Database Modeling
  - Database and Application Design
  - Functional Design

**PHASE – II: Development**
- Data Creation
- Configuration
- Customization/Application Development
- Test cases and Testing
- Integration
- Pilot Implementation
- User Acceptance Test

**PHASE – III: Implementation**
- Enterprise Wide Implementation
- User Training
- Transfer of Technology
- Support
Realizing returns from GIS investments

Comparison Chart between Old & New Proposed Property Tax

Comparison chart between Number of property before & after GIS survey

Total Property Before GIS Survey
Total Property after GIS Survey
Challenges

• Limited awareness amongst local residents about their key property details

• Change Management {Internal & External -- building awareness on long-term benefits}

• Support of staff in survey and data collection

• Accessing and integrating legacy data from various other departments

• Need to build long-term vision, phased approach and management buy-in
Learning’s, Recommendations and Way forward

- Re-engineer business processes to implement key IT initiatives
- Creation of standardized workflows e.g. mandate GIS updates in any property related transactions
- Maintain active and accurate database of taxpayers to minimize leakages
- Regular revaluation of base for levying property tax
- Web-enablement of tax collection through online payment / computerized collection centres
- Opportunities to reuse GIS database across other initiatives for ULBs
An integrated Geospatial platform for providing reliable, timely, and accurate location based/ GIS Information and services to the public