Application of Geospatial Platform for Enhancing Property Tax in Shakarpur Municipal Corporation Region, Delhi

by **Rahul Pratap Shahi,** *Research Scholar,*
Department of Geography,
Central University of South Bihar, Gaya - 824 236, India
Email : rahulpratapshahi12@gmail.com

Manjit Singh, *Assistant Professor,*
Department of Geography,
Central University of South Bihar, Gaya - 824 236, India
Email : manjit.singh.dse@gmail.com

Abstract :

Property tax is a type of ad valorem tax that is calculated based on the value of the property. These taxes play a crucial role in supporting the infrastructure of exponentially growing urban spaces. In developing countries like India, the design, collection and application issues of property tax have been a major challenge. In the metropolitan areas like Delhi, inefficient property tax collection happens due to ineffective tax information system, issue of market-based valuation, low coverage, and infrequent updates have been issues with property tax estimation. The role of e-governance is gradually taking the center

place in terms of offering better and more transparent local governance as also solving the current limitations of the system. The process of calculating property tax and property tax defaulters still is not satisfactory as it is a very tedious and time consuming procedure. Digitization of the tax collection system has stream-lined this process for citizens as well as government departments. Also, citizens will be able to easily identify their property on websites and cross checks their assessment calculation. The basic objective of this study is to design; developing an interactive and user-friendly geospatial property tax information system can greatly enhance the property tax estimation process. A 3D GIS platform has been created with a geographically referenced property database of Rohtas Nagar, Shakarpur of East Delhi on a 1:2000 scale by using incorporating spatial query and visualization tools can greatly improve the effectiveness of updating and pro-cessing property tax records. The major finding of the study includes household level property tax collection information with geo-coded maps with visualization effects. The study also highlights the lack of efficiency of Delhi MCD in tax collec-tion and helps in identifying gaps, priority areas at micro level.

Keywords : property tax evasion, geospatial data, overlay and spatial query.

Introduction :

The challenges pertaining to the collection property tax is an area that hasn't been studied as extensively as some other topics. Especially in developing coun-tries where poor collection rate is compounded by low coverage base of property tax. Acknowledging the number of unassisted or missing properties can be a major challenge for designing and collecting property tax. Municipal corporations rely heavily on property tax as their primary source of income, which is why it's so important to assess properties accurately and collect taxes efficiently. Property Tax revenue mobilization at the local level is ineffective due to lack of information. Property Tax details in the SDMC are maintained manually, which requires a lot of human effort. Moreover, it seems like the municipal authorities have difficulty tracking tax defaulters and un-authorized and under-taxed properties because the property tax details are still maintained in paper format. The maintaining property tax details in paper format results in a low coverage of properties, low revenue, and an inefficient tax management system. Illegal constructions, un-assessed properties,

and administrative inadequacies have eroded the property tax base. It looks like a significant number of properties are not included in the tax base, and the ones that are included are often inaccurately assessed. This leads to inefficient tax collection. Also, disputes in properties result in poor tax assessment.
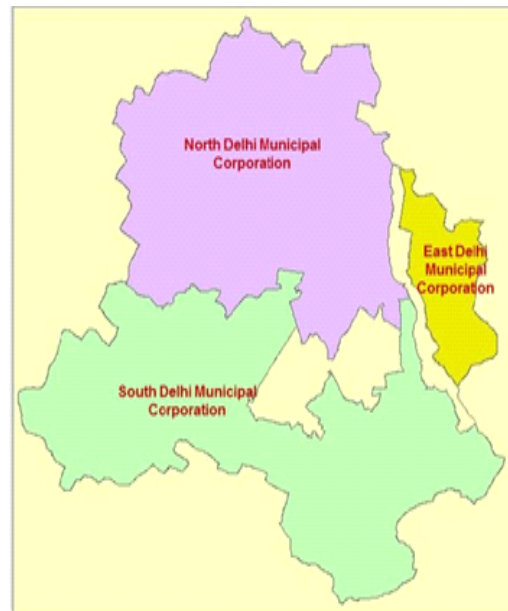
The Delhi government has been working on the DSSDI project to create a data set with information on building number, owner name, address, building classification, and its usage, among other things. If tax details are maintained geospatially using the geographically referenced property database, the efficiency of tax collection can be improved. Spatial dimensions of all the structures of property can be maintained in a Geospatial data set. The Geographical Information System based technology can help solve the problems of the current Municipal Corporation practice and improve the efficiency of tax collection.

Study area :
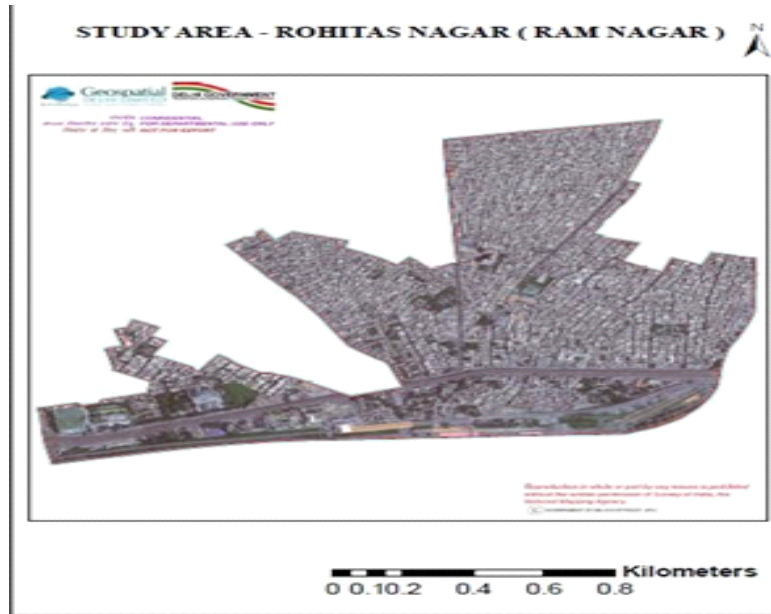
The study area is Rohtas Nagar, Delhi which lies in Shakarpur Delhi zone, which is located on **28°40'43"N 77°17'17"E**, and nearby cities are Shahdara, and Loni.
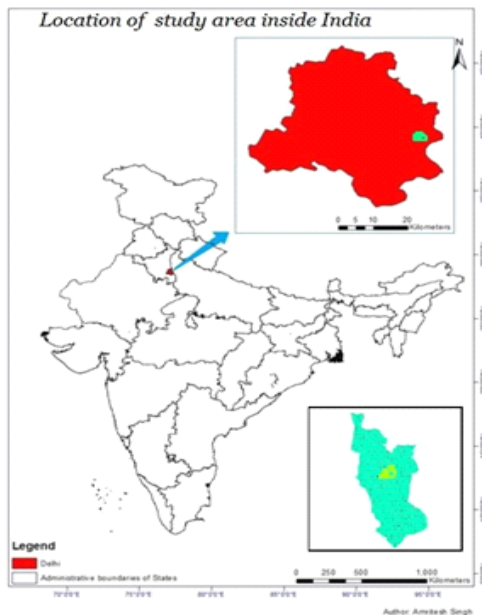
Map 1: Location of study area   **Map 2 : Trifurcation zones of MCD**

Map 3 : Study area- Rohtas Nagar

The collection of property tax is a major source of revenue for the local government, according to MCD East Delhi Municipal Corporation. Geospatial assessment could help identify gaps in tax collection and provide a more accurate estimate of the total revenue. With this objective in mind, a project- "Joint validation of Geospatial property data and the MCD (Municipal Corporation of Delhi) linked data with EDMC (East Delhi Municipal Corporation) tax inspector and legacy digitization of EDMC property ledger" is being carried out for EDMC.

1) GSDL-Geospatial Delhi Limited is a Government of NCT of Delhi Company. As a custodian of the data inherited from DSSDI project GSDL under the Delhi Geospatial Data Infrastructure Act 2012 is mandated for data creation and updation facilitating data access to the departments, development of value added services, and usage of data for the benefit of citizens.

Geographic information is collected in the field by surveyors who measure properties, their dimensions, and the data information which describes the property. The properties are positioned geographically using either Photogram metric maps or aerial photographs (Orthophotos).

Building Unit Name	Building Name	Locality	Sector
Door House Number	Building Number	Sub Locality	Pin code
Floor No	Building Type	Sub Locality1	Zone Name
Occupant Name	Building Status	Sub Locality2	Zone Number
Type of Construction	No. of Floors below ground floor	Colony Name	Ward Name
Rent Status	No. of Floors above ground floor	Sub colony name	Ward Number
Classification	Ground for Parking	Block Number	District Name
Sub Classification	Type of settlement	Road Name	Urban Body

Table 1 : DSSDI attribute data

2) DSSDI Project : The purpose of the project is to support the government of Delhi and all Municipal Corporations in Delhi state in Developing and implementing an improved strategic management approach to enhance the revenue of SDMC's property tax collection system. The property database of the DSSDI project will be used as an input as it contains property GIS.

Under the DSSDI project, property databases on Building and building units were developed for all 356 villages that come under MCD jurisdiction.

Components of DSSDI property database :

Each building and unit has a unique ID. Database of building and building units is defined in 57 and 47 attribute fields respectively according to its usage, type, location, etc. Building Unit data is divided into 12 classes according to its usage and further sub classified into 275 subclasses.

BUSINESS (e.g. Shop, Hotel)	HISTORICAL MONUMENT
COURT	INSTITUTION (e.g. Ashram, Dharamshala)
DEFENSE OFFICE	OTHERS (e.g. Guard Room)
EDUCATIONAL (e.g. College, School)	RELIGIOUS (e.g. Church, Temple)
GOVERNMENT OFFICE	RESIDENTIAL
HEALTH (e.g. Clinic, Health Club)	UTILITY CENTRE (e.g. Bus Stand, Fire Station)

Table 2 : DSSDI Unit data

Objective :

Identifying the maximum number of tax defaulters and finding the appropriate way of collecting taxes is the objective.

Data Sources :

Satellite Image : World View-2 and USGS satellite image data.

Municipal corporation of Delhi (Excel data) : MCD (Municipal corporation of Delhi) provides excel data which has detailed building information like (Occupant name, building ID, floor number, etc).

Software Information : ARCGIS 10.2.2 is used for analyze the satellite image and MCD excel data.

Methodology :

The asset database of DSSDI project will be used as input as it consists of asset GIS along with 3D pictorial database at 1:2000 scale to capture the information. First, a joint verification of DSSDI data with SDMC ledger data should be done to find the defaulters. However, the data needs to be updated and matched with the SDMC data to bring it to the required quality before the application is actually developed. (Flow chart)

```
                    ┌─────────────────────────────────────┐
                    │  IDENTIFICATION OF RELEVENT DATA SETS │
                    └─────────────────────────────────────┘
                                     │
                                     ▼
┌──────────────────┐       ┌──────────────────┐       ┌──────────────────┐
│  NON-SPATIAL DATA │ ════▶ │  DATA COLLECTION  │ ◀════ │   SPATIAL DATA    │
└──────────────────┘       └──────────────────┘       └──────────────────┘
                                     │
                                     ▼
                    ┌─────────────────────────────────────┐
                    │  DATA EDITING & DATABASE CREATION     │
                    └─────────────────────────────────────┘
                                     │
                                     ▼
                               ◇ DATA        ◀══════════ NO
                                 CORRECT? ◇
                                     │
                                     ▼
                          ┌──────────────────┐
                          │  DATA PROCESSING  │
                          └──────────────────┘
                                     │
                                     ▼
                              ┌────────────┐
                              │   RESULTS  │
                              └────────────┘
                                     │
                                     ▼
                      ┌──────────────────────────┐
                      │  INTERPRATION OF RESULT   │
                      └──────────────────────────┘
                                     │
                                     ▼
                ┌─────────────────────────────────────────┐
                │  CONCLUSION AND RECOMMENDATIONS           │
                └─────────────────────────────────────────┘
```
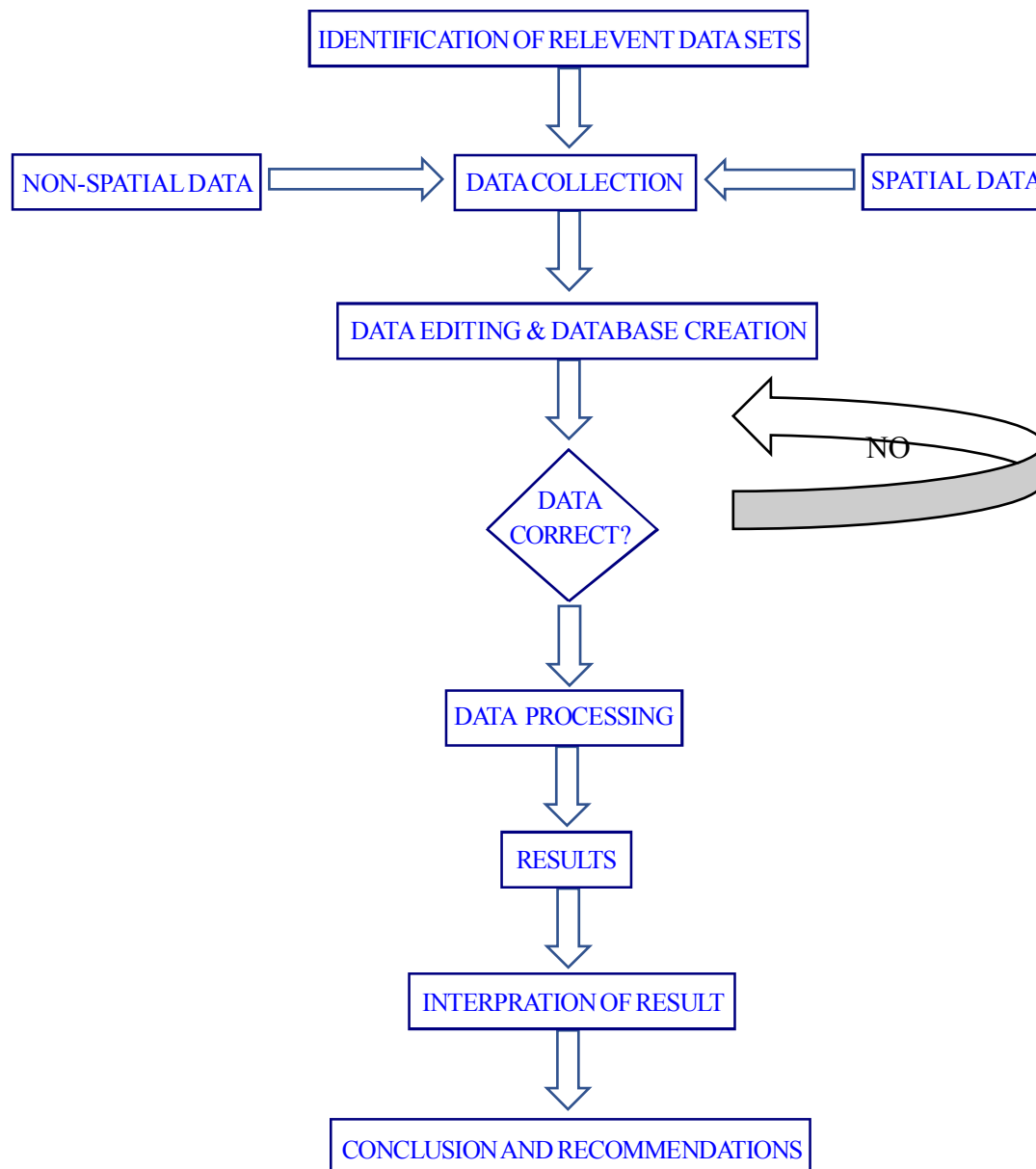
Results and findings :

After getting results in shapes of the maps (given below) paid and unpaid buildings can easily be identified. The maps given below are color-coded, with

each color showing the tax statuses; (red) color shows the paid status of the building and golden color shows the unpaid building status.

Creating a new file to improve the inputs from the GSDL property data, EDMC Ledger, and online taxpayers. That's a great way to make sure that you have all the information you need for your project. The database of population involves two different stages. First, the field in the geo-database is BUILD_ID, D.H.S No., OCCUPANT, Locality, etc. Second is External Database entry with given attribute data and spatial joining functions has been use for correlate ledger data with data of GSDL (DSSDI Buildings and Building units). Criteria on "Tax Paid & Tax Not Paid" has been designed as suggested by EDMC. Once you've done the spatial joining and sorted the data, you analyze each individual record to identify certain points. Then, you can generate a final spatial map with a list of the individuals.
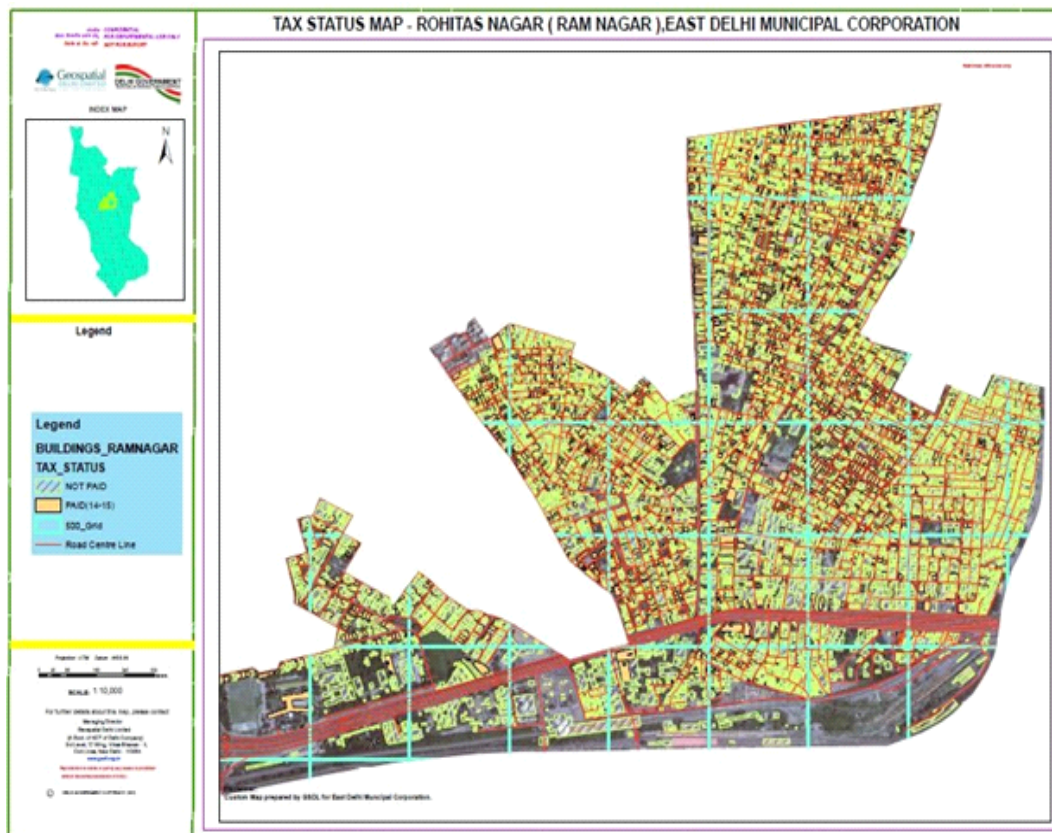
Map 4 : Tax Status Map
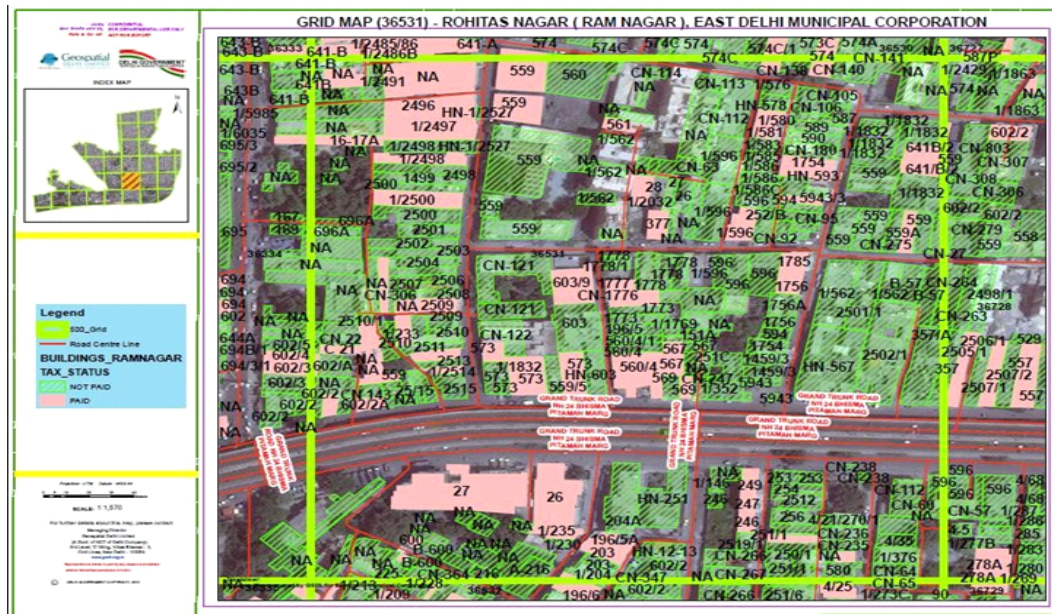
Map 5 : Grid Map

From the results it is clearly visible that the maximum number of buildings shows unpaid status, which means low revenue productivity. The reason behind low revenue collections from property tax seems to be low coverage of tax and low collection efficiency, owing to non-inclusion of many properties in the tax base.

The role of e-governance is gradually taking the center place in terms of offering better and more transparent local governance and also solving the current limitations of the system. The process of calculating property tax and property tax defaulters still does not get satisfactory as it is a very tedious and time consuming procedure. Digitization of the tax collection system has streamlined this process for citizens as well as government departments. Also, citizens will be able to easily identify their property on websites and cross checks their assessment calculations. The use of e-governance will certainly enhance the quality of the people services with maximum efficiency and transparency.

The developed spatial database under joint validation is therefore tested to ascertain its validity. This proves that the characteristics formed during joint valida-tion are legitimate to take part in the analysis alongside current databases.

The collection of property tax can be enhanced only through increasing tax base and covering those properties which remain uncovered due to lack of monitoring and inadequate data collection. Further, the existence of mapped taxpaying properties with the contained information is very useful in GIS, the exchange of information and coordination between various governmental departments and agencies will bring enthusiasm in the hitherto lackadaisical approach. Hence, use of GIS in tax collection will remarkably improve tax collection and notably minimize the tax evasion.

The need of the hour is to utilize e-governance to deliver maximum to citizens to ensure ease of tax payment, to bring fairness by improving transparency, to transform commitment to results by enhancing accountability and improving efficiency through ameliorating property tax collection.

References :

- AfDB/OECD : "African Economic Outlook 2010", 2010.

- Bahl, Roy : "Property Tax Reform in Developing and Transition Countries", Fiscal Reform and Economic Governance project, USAID, December 2009. Geospatial Delhi Limited (GSDL), Delhi.

- Cabral, Marika, and Caroline Hoxby : "The Hated Property Tax: Salience, Tax Rates, and Tax Revolts", Working Paper 18514, National Bureau of Economic Research, Cambridge, MA, November 2012.

- Michael Bell : "Implementing a Local Property Tax When There Is No Market: the Case of Commonly Owned Land in Rural South Africa," George Washington Institute of Public Policy, January 2011.

- Bird, Richard M., and Enid Slack : "Land and Property Taxation in 25 Countries: A Comparative Review", Research Reports, CESifo Dice Report, 3/2005.

- Crowe, Christopher, Giovanni Dell' Ariccia, DenizIgan, and Pau Rabanal : "How to Deal with Real Estate Booms: Lessons from Country Experiences", IMF Working Paper,WP/11/91Eckert, Joseph K., "Computer-Assisted Mass Appraisal Options for Transitional and Developing Countries", in Bahl et.al.(ed.), 2008.

- Haldenwang, Christian von, and Maksym Ivanyna : "Assessing the Tax Performance of Developing Countries", Discussion Paper, Deutsches Institut für Entwicklungspolitik and German Development Institute, 20/2010.

- OECD : "Tax Policy Reform and Economic Growth", OECD Tax Policy Studies No. 20, Paris 2010.

- HPEC, (2011) : "Report of High Powered Expert Committee on Urban Infrastructure and Services, Ministry of Urban Development and Poverty Alleviation. Government of India.

- Sennoga, Edward B., David L. Sjoquist, and Sally Wallace : "Incidence and Economic Impacts of Property Taxes in Developing and Transitional Countries", in Bahl et al. (ed.), 2008. Tax Notes International, "Tax Court Calls for New Property Valuations", August 30, 2010.

- Wallis, John Joseph : "A History of the Property Tax in America", State Tax Notes, May 29, 2000.

- UN-Habitat : "Land and Property Tax - A Policy Guide", United Nations Human Settlement Programme, Nairobi, 2011 (Principal author: Lawrence Walters).

- Mathur, O.P., Debdulal Thakur and Nilesh Rajyadhyaksha, (2009) : Urban Property Tax Potential in India, National Institute of Public Finance and Policy, New Delhi.

- Rao, U.A.V. (2008) : "Is Area- Based Assessment an Alternative, an Intermediate Step, Oran Impediment to Value-Based Taxation in India", in Bahl Roy, Martinez- Vazquez and Joan Youngman, Making the Property Tax Work, Lincoln Institute of Land Policy, Cambridge; Mass.

- Slack, Enid, (2011) : "The property Tax - in Theory and Practice", IMFG Papers on Municipal Finance and Governance; Munk School of Global Affairs, University of Toronto.