PROPERTY TAX EVALUATION AND MANAGEMENT USING GEOSPATIAL TECHNOLOGY

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Abstract. *The current property assessment and tax collection system is today under pressure to improve its efficiency. Changes in the counts of floors, land areas, covered areas, type of building, property occupancy, tax categories, property utilization, land usage, etc., are not regularly updated. In addition, there is no regular monitoring and updating of property units which leads to revenue loss. This research intends to examine the application of spatial technology to improve property tax evaluation processes and work efficiency in the tax process. Research would increase consistency and uniformity in the system of property tax management. Comprehensive geo-statistical reporting, visualization, and theme charts will enable governments to estimate the income recovery potential and build the right policy tool. Tax defaulter, hidden property, possible tax recovery, and tax types of property are easily identified through analysis and visualization. Tax assessment variables can be monitored and updated with GIS and Remote Sensing Technologies, such as areas, tax categories, important roadways, and building types. This will make the property tax system more transparent, efficient, updated, and improved government revenues.*

Keywords: *Property Tax, GIS, Technology, Management, Land use/ land cover, Decision support system*

1. INTRODUCTION

In the past, monitoring and document registration were the most popular technique for maintaining the land ownership track. The position and scope of a property in the property mapping are digitized on the ground, and a unique identification number is assigned [1]. An accurate property mapping should reflect the size and shape of each parcel of a town/town. Data from other sources are deficient and outmoded since reliable paper maps, cad maps, and data are not available. Since there was no CAD drawing or analog to update maps when further spatial subdivisions or consolidations are being implemented [7]. The author has created many digital maps for the analysis of property tax for each parcel. It is considered an important aspect for earth feature system modeling and understanding. Land use is defined as any human activity or economic function associated with a specific piece of soil [8].

In contrast, land cover is defined as the sort of feature on the earth's surface. Land cover maps are now being generated at local, regional, and global levels [9]. A basic map contains crucial background information and is generally paired with other map levels that indicate operational information maintained by a local government department and agency. The DGPS geo-referral map has been developed based on new satellite imagery, toposheet, base maps, a current master plan map, and other input maps. This provides information on all significant physical characteristics, including roads, bridges, city roads,

map for the research region, this choice was outdated. In addition, the collecting of corner points using GPS also took time. The raster imagery (satellite imagery) is utilized in the heads-up digitalization as the background image [2]. Regular updates or monitoring are not available in adding or removing distinct units in those revenue sources. For example, in the case of property tax, it is not closely monitored if property taxes are imposed by owners for the addition of homes, floor additions in residences, change of ownership, etc. As a result, towns appear to be losing substantial sums of income [3]. This study shows how the GIS could help monitor this process efficiently and stop revenue loss through effective property tax practices. The property tax is not recognized as high due to poor assessment rates and weaker revenue collection efficiency. Today, the most significant issue for towns and local municipalities is defining improved property valuation procedures, keeping a regular track of income collection, and recording losses due to derogations [4]. An effective GIS can hold correct taxable information and revenue collection that can be visibly monitored. It can periodically send automated notices to taxpayers to inform them of pending duties [5].

Visual representation not just creates a compelling and precise revenue collecting method for the entire property tax system but minimizes the frequency of on-site visits for remedial and other assessment purposes [6]. This would also make all the linked city departments accessible and provide a clear and consistent tax assessment system. The digital tax maps require continuous updates to the corresponding database. This also applies to the necessity

roadways, rails, essential landmarks, watersheds, drains, canals, rivers, etc.

2. STUDY AREA

South Delhi Municipal Corporation (SDMC), which was founded following a division of the erstwhile Delhi Municipal Corporations into three ("trifurcation"), is one of Delhi's municipal corporations. SDMC serves the population of about 56 residents in the Lacs with a responsibility to efficiently monitor, upgrade and expand civic facilities to build a better morning for Delhi citizens. The area is 656,91 km^2 and is further subdivided into four zones-the Central, South, West, and Najafgarh Zones and contains 104 wards (Fig.1).
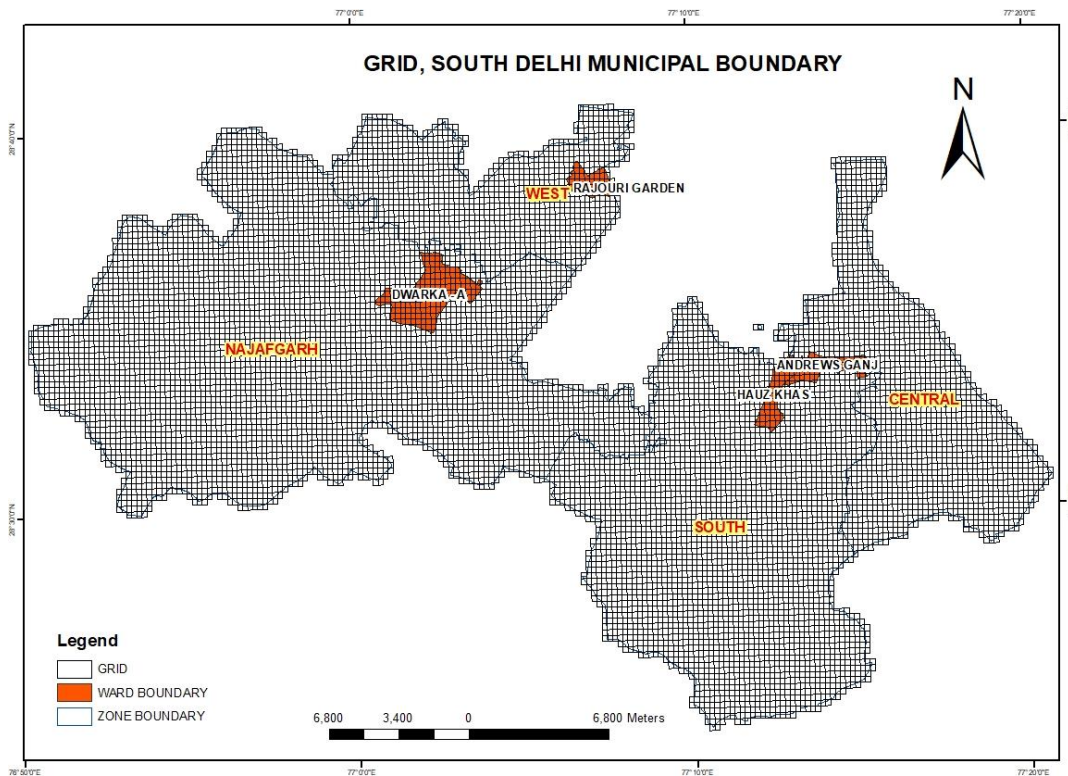
Source: Realized by authors
Fig. 1 South Delhi Municipal Boundary

3. MATERIALS AND METHODS

On the system, a unique ID will be established for each property. This database already includes the BUID and PID (Property ID) based on the Grid and Building ID. This unique ID is utilized as a single code for all future reference and identification of the property. But according to the MCD Act, the single ID for a property can be created using a specified formula which can be used to provide citizens and other property reasons. Delhi Municipal Corporation Act (MCDA) deals with the identification code and the way of notification (Property Identification Code Number). The property identification code number by which any procedures in any field within the competence of the company may be known is set as follows:

1. The first three digits shall represent a number of the ward.
2. The following four digits shall show the number of the colony in numerical form.
3. The next six numbers shall show the alphanumeric form of the premises number and
4. The sub-number of numbering premises shall be indicated by the next two digits.

XXX	-	XXXX	-	XXXXXX	-	XX
Ward No.		**Colony No.**		**Premises No.**		**Sub No.**

However, the significant constraint of this frame is that ward boundary of MCD change at least once in 5 to 10 years, based on census data, to equalize population. This means the first 03 digits change once in 10 years at least.
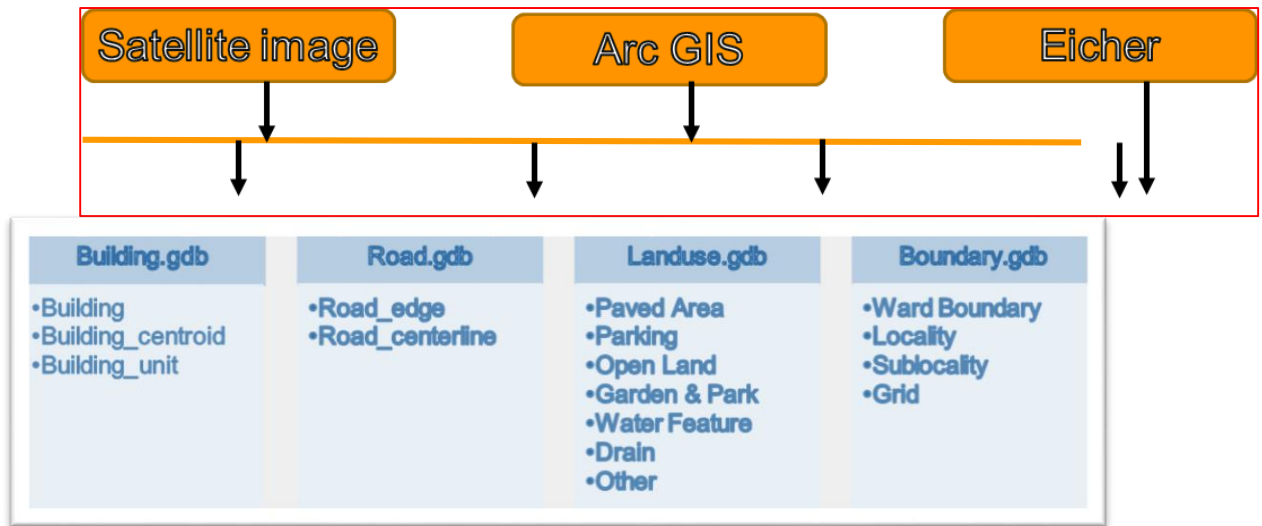
Fig. 2 Methodology adopted.

Efficient management of real estate taxes relies on reliable, timely, and cost-effective data. The most labor-intensive and expensive property tax administration function is building and maintaining property inventory and attribute databases. Tax mapping is a vital aspect of any integrated property and tax management system. Tax mapping is a classic method for identifying real estate units or "tax plots." It established the connection between real estate on the spot and property evaluation and tax records of the tax authorities. Tax maps give information about essential real estate for the public. Tax parcel maps are essential for property assessment (evaluation). They enable identifying the property's location, specify the size and shape of each plot, determine the actual land use, and aid in identifying undeclared properties for taxation. Although tax maps are a general reference to property sites, they do not replace official cadastral survey documents and should not be utilized in legal disputes over land. They allow the development of a real estate recording system that can be converted to data computing (Fig.2). Digital parcel mapping is the process of digitizing and keeping, and updating tax maps utilizing GIS for local government units based on the paper map (cadastral basis maps, property identification maps). This is usually done in parallel with the installation of a computerized property taxes system. This can take time and cannot be managed sustainably if the process flow and the system's aim are not thoroughly analyzed from the outset; however, if the advantages for improved property management and higher real estate assessment are numerous based on cautious local wants and requirements analysis. This will significantly expand the local tax base and enhance local authorities' financial alternatives and freedom to invest in an upgraded social service provision and physical infrastructure. In return, visible efforts will improve local citizens' "tax morale."

Usage details:

Grid No.						Survey Sequence No.					
Plot Size/Area (in Sq. mtrs) (Refer to General Instructions for area conversion)						Total No. of floors					
Sl No	Floor No.	Type of Property (Refer to Section 2 of Instructions)	Property No.	Property Name	Covered Space (in Sq. mtr)	Type of Occupancy (Uninhabited/ Rented/ Self Occupied)	Type of Structure (Pucca/ Semi-pucca/ Kutcha)	Year of construction	Electricity CA No.	Remarks
1	G	R	1		204	SO	P	1990		
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										

Use Annexure-1, if required.
Floor No. : Basements (B1, B2,...), Mezzanine(M), Stilt/Parking (S), Ground (G), 1ˢᵗ, 2ⁿᵈ......, Terrace (T).
Terrace (check for): Telecom Towers, advertisement hoardings.
Also check for: Advertisement Hoardings / CNG Stations / Petrol Pumps/Storage Tanks/Swimming Pools.
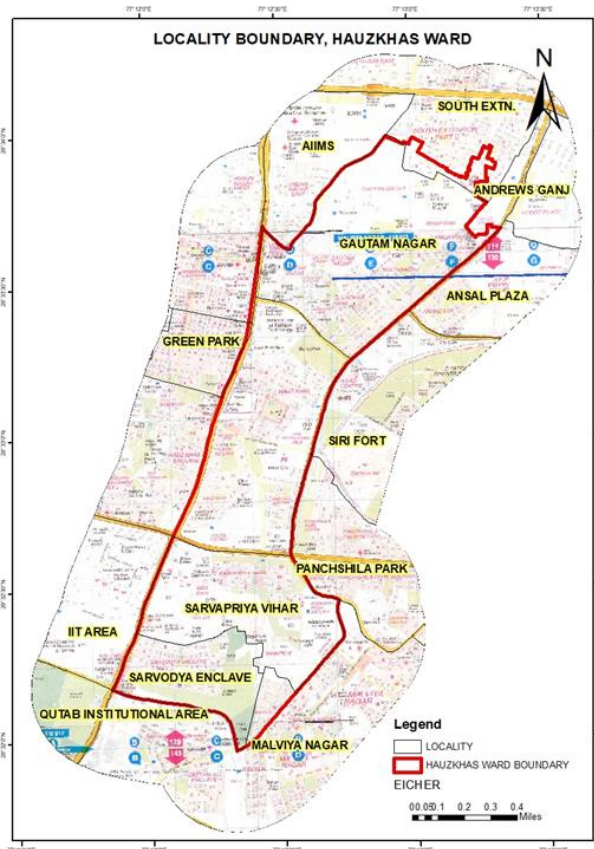
Table no.1 Survey Form

4. RESULTS AND DISCUSSION

During the administration of the property owner's questionnaire, their property was also evaluated. During the questionnaire delivery, the attribute information or building attributes needed for property assessment not obtained from the photograph were acquired from the field. This comprises the owners' name, house number, address, building type, area, age, usage, tenancy, power supply, and water availability (Table 1). The quality and amount of the data used correlate with the precision of the results of the evaluations, and hence the precision and correctness were ensured [10]. Though the digitalized buildings automatically had a unique identifier to distinguish between the sampled properties and other properties, the GPS coordination locations of the sampled properties were recorded during the sampled property listing. This was done

to facilitate data entry and to allow combined operation for the sampled characteristics. Where the landowners are willing, a photocopy has been gathered from scanning documentation on properties such as a survey plan and approved building plan. The pictures were also taken of the property owners and their properties. These have been scanned and used for HyperText Markup Language (HTML) or linked in the database. This cannot be achieved by the manual property evaluation method due to error or omission, or conduct. The utilization of high-resolution satellite images has solved this difficulty. While it helped attain a 100% coverage essential for tax growth, the classification of property by field research helped to incorporate a taxable property into the tax base. The property owners or their representatives were given a structured questionnaire tailored for the property listing (Fig. 3)

Source:

Realized by authors

Fig.3 Creation of Locality &Sub-Locality Boundary

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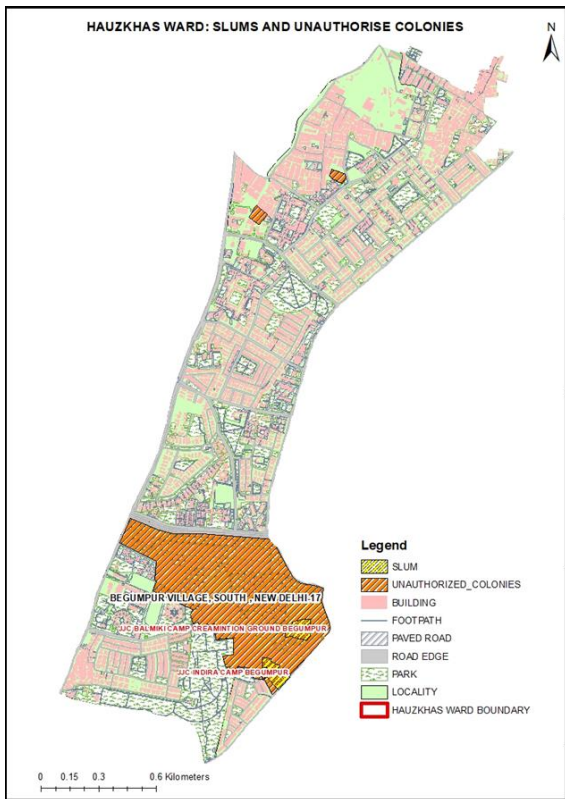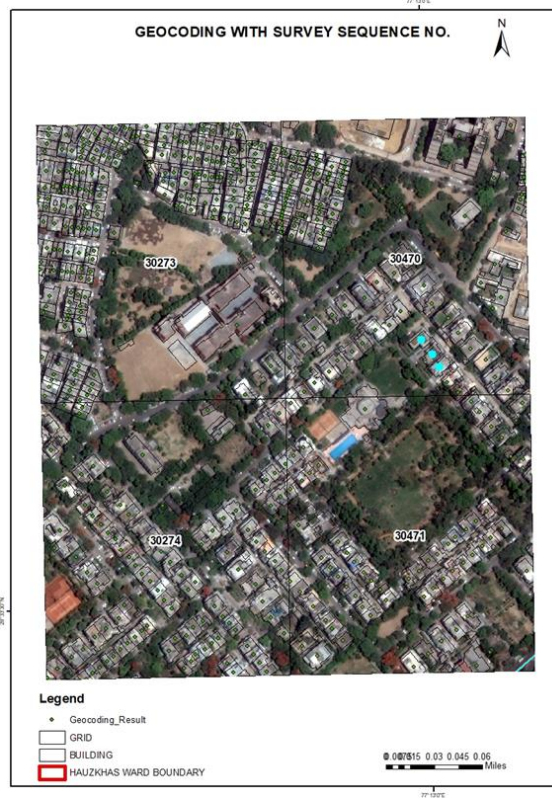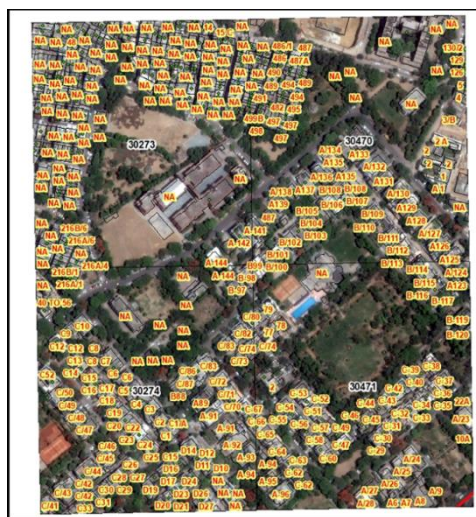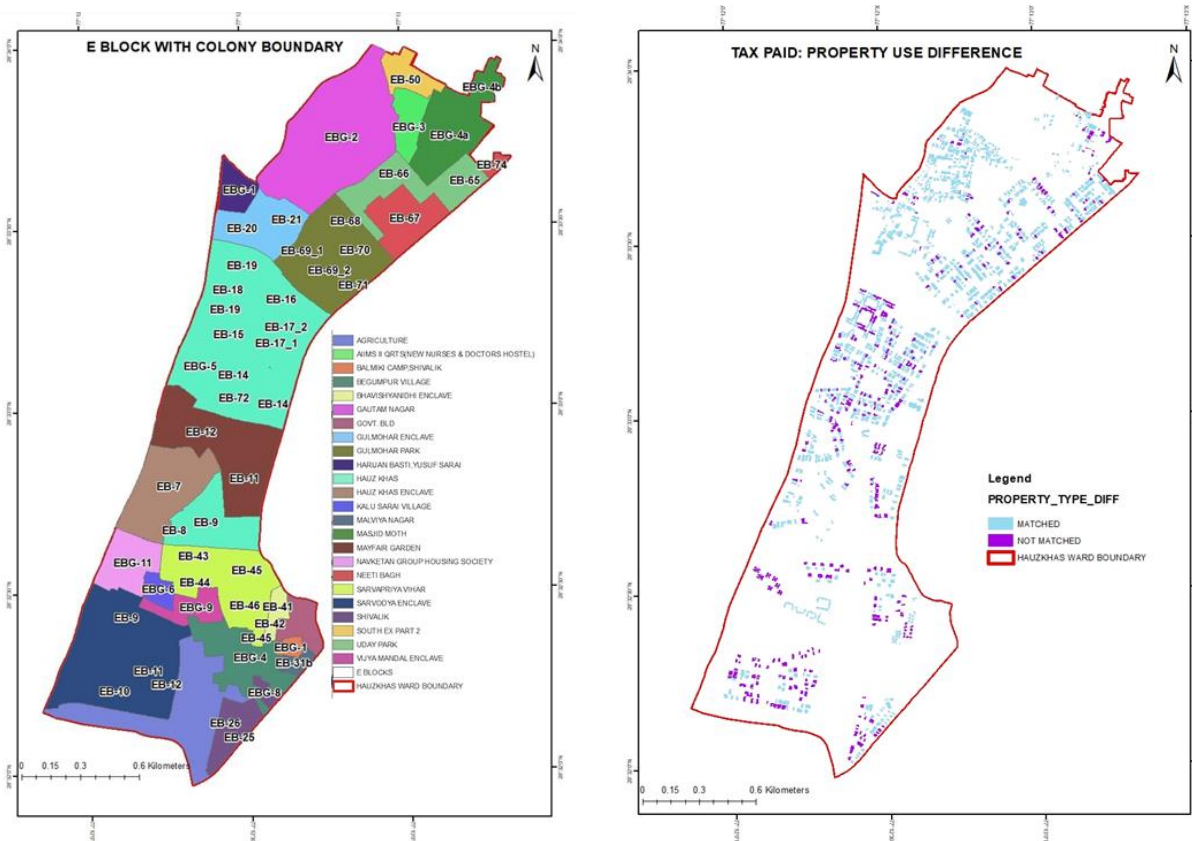

Fig.4a Slum and Unauthorised Colony

Fig. 4b. Mapping of Survey data

Source: Realized by authors

Fig.5 Creation of Unique No. for Buildings

Source: Realized by authors
Fig. 6 Colony Demarcation and Category Distribution

This was done to facilitate data entry and to allow combined operation for the sampled characteristics. Where the landowners are willing, a photocopy has been gathered from scanning documentation on properties such as a survey plan and approved building plan. The pictures were also taken of the property owners and their properties. These have been scanned and used for HyperText Markup Language (HTML) or linked in the database. The property map has been spatially associated with property attributes to assist in determining property taxes (Fig. 5). The combination of attribute and space data generates the geo-database. The geo-database was linked with the estimator of the fiscal model to offer a simple and effective method of taxation [13]. The evaluation method was used to model an estimate for property tax management. The valuation of property is a complicated task. The assessors always have to provide property owners with easily understandable explanations of how their properties are appreciated. A hyperlink is another convenient approach to identify the property [14]. When you move your cursor over each property, it links the property in the database to the owner's name and displays it on display, as shown. This method can also connect the amount paid or due by the owners of the property. This strategy minimizes search time and simplifies and simplifies the task of property tax managers. Geospatial technology is capable of generating property data in the absence of a cadastral map. It can also be utilized to raise the tax base to 100%, eliminating the delay in property valuation and enhancing property tax revenue collection

[15]. The study also revealed that the GIS-based property tax system could estimate a significant property value in an area in the short term, increasing efficiency, removing valuation delays, achieving effective delivery of services, and reducing operating costs (Fig. 6). While the GIS-based property tax system is recommended, institutional capacity improvement is needed for adequate property tax service providers, notably in remote sensing, GIS, and ICT [16]. Many streets have no name, and many houses are not particularly numerous in the urban development zones. It is advisable to name streets and dwellings as part of creating a GIS property information system.

The success of property tax management depends on the government's political will. Governments are generally interested in programs that create revenues to manage state affairs; consequently, they are most interested in projects which deliver rapid results [17]. Therefore, it calls upon a government with the political will to invest in a long-term project or one willing to invest extensively in a project to complete it within its tenure in office [18]. Given the importance, advantages, and urgency of introducing a GIS-based tax reporting system, the government should have the political will to prioritize the completion of the project to prevent a failure in the mid-term project. Many elements have a role in the economy of land use. Due to its impact locally, property tax has a direct and indirect effect on the economy of land use. Since property tax plays a significant role in land-use decisions, planners should ensure that property tax policies do not meet intended land use goals

35

and that these goals, if possible, are modelled [19]. There are currently insufficient grounds for adequately discussing many crucial tax/land use linkages. In addition, planners are often not very familiar with tax matters [20]. This study will offer the planner a good understanding of property tax, how it is utilized in other regions to achieve land use aims, and the considerations needed for developing a tax and land use program. Although the general rule is the significant usage of property tax, many localities are considerably less dependent on property tax than others. This is primarily the case in countries that have permitted local governments to charge other taxes, such as sale, income or payroll, and/or given local governments with additional money through grants. Local governments have chosen to use state tax sources to augment local needs with offerings. Finally, it has been established that the real estate component carries the highest taxation burden.

5. CONCLUSIONS

Based on the research and the examination of individual tax plans, various conclusions were formed about land use planning concerning the use of property tax. There are both administrative and substantial concerns with property taxes that affect investment decisions for land use. This influence is, in many situations, negative. The most successful of the reform initiatives enacted so far were those concerning administrative failures. Very little experimentation has been made with substantial reform. As a result, legislation continues to rectify substantive faults in property tax by withdrawing from property tax exemptions. Individualized tax plans had very few ways to assess the efficiency of fiscal measures. Neither case study has disclosed that the local

government has undertaken a cost-benefit analysis. In truth, few revenues lost because of the tax subsidy are preserved far lower than the amount due to the tax exemption. In general, many of the tax initiatives have been connected with an overarching development plan or well-defined objectives. It also appears that if they were linked with other regulatory measures, many of the tax schemes would be more effective. The system has been dynamically created to allow the introduction of utilities, despite its capacity to perform property taxation, as data on property water and electricity connections were collected in the database. In addition, organizations have their employment policy and the degree to which systems must be capital-heavy rather than labor-intensive. However, as the property tax information system is related to high technology such as GIS, the application needs to be maintained and maintained according to the information it supports. Since the system has been built to support a continuous program, it must be kept current to achieve its objective because the data will change in due course (update). Precise methods must be developed to preserve and cope with the impact of such developments. The administrative staff must thus produce a strategic strategy and perform thorough research to solve all these problems to ensure that the GIS technology for property tax management is successfully implemented. This solution increases the regular re-inspection of the tax base. It allows users to turn all relevant data sets for a property tax assessment into valuable information without specialization.

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