

# **Property & Garbage Tax Collection via Address Information Systems: A City Case Study Trabzon**

**Volkan YILDIRIM and Recep NISANCI, Turkey**

**Key words:** Real Estate, Property Tax, Garbage Tax, Address Information System, GIS

## **SUMMARY**

The main task of municipalities is to provide the most effective services to citizens in cities. In order to finance and achieve these services, in most countries like Turkey, grand incomes collected by way of real estate tax and environment cleaning tax which also called garbage tax from land owners and residents is a very important. For example in Turkey, because of lack of an efficient address based information systems, approximately 20% of real estate taxes and 18% of environment cleaning taxes still can not be collected by municipalities. The property tax is generally recognized as a 'good tax'; its role is essential in the process of recovering revenue, funding public services and promoting social development in urban areas. Real estate and environment cleaning taxes problems are often characterized as uncertain, complex, and dynamic. In collecting such taxes and managing basic urban activities in a modern way for local government, the existence of a network based geospatial information systems is a very crucial subject. Specifically, an Address-based Information System is fundamental for collecting these taxes to eliminate current issues in order to provide some valuable services to individuals. Such a system can set up a very good relationship among the basic geospatial data layers for a city-work and link these geospatial data with corresponded objects directly. In this paper, an implementation of an address-based information system in municipality of Trabzon city of Turkey is explained as a case work with respect to manage a real estate and environmental cleaning tax collection procedures. Real estate values which reflect property characteristics are processed on roads-streets by a GIS network analysis concept. Finally, tax bills which are calculated automatically by this system are sent to related individual addresses to inform them. As a result, a successful property and environmental cleaning tax collection control system is provided and in accordance tax revenue is increased.

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## **1. INTRODUCTION**

Expanding responsibilities of local governments are not adequate for them to function efficiently and effectively; sufficient local funds are required for the success of local government reform process. Thus, the availability of enough funds to realize at least of the aspirations of local citizens is crucial. Central Government in Turkey has historically been cautious about giving local authorities full responsibility over local budget. In Turkey municipalities have great importance regarding their share from budget, which is determined by their size, and they are dependent on central government as their main source of income [Bindebir, 2004]. There are three types of revenue sources of municipalities in Turkey. First local resources (municipal taxes, user charges and revenues other than taxes); secondly central government transfers and loans too. In Turkey, local taxes (property taxes, garbage taxes, advertisement and notification taxes and entertainment taxes) play a major role for financing services and reducing disparities across geographic regions and between different kinds of municipalities and social groups [Sagbas and Bagdigen, 2003]. Property taxes and garbage taxes are the most yielding tax between these. So, collecting these taxes exactly is crucial for local governments. In some researches, it is seen that, local governments lost millions of dollars for lack of declaration and defaulter tax payers. Principle cause of this lost is unavailability of any contact with those people who do not declare their property or do not pay for these taxes. In pilot region studies, it is also seen that, address based Geographical Information Systems (GIS) applications are used for eliminating this lost. Fundamental problem is not determined accurate address data which provide link between owner and real property.

## **2. CURRENT SITUATION IN TURKEY**

The share of municipal tax is only 8% in the total revenue. Property tax and garbage tax two-thirds of the municipality tax income. While price index increased by 4.16 times between 1993 and 1995, in the same period, total municipal revenues and municipal tax revenue rose by 3.52 and 8.45 times, respectively. It means that municipal tax revenues doubled in real terms, while the total municipal revenue was not able to cope with high inflation rate [Nippon, 2000]. Property taxes are the most important source of income and play important revenue role in municipalities' services in Turkey [Kitchen, 2004]. But, in researches, it is seen that, it is inefficient to collect, especially the property tax, left to the administration of local governments, before 1998. Sometimes municipalities hesitate to collect the taxes by claiming that the costs of administering taxation, including personnel cost and to maintain proper databases, are larger than the expected revenue due to successfully collected taxes. However, according to the research, computerization of tax collection system would increase the cost/benefit ratio from 0.27 to 0.73 in Turkey [Nippon, 2000].

In Turkey, owners are legally responsible for payment of property taxes, and occupiers of residential property are responsible for payment of garbage taxes. These taxes are collected by local governments but collecting rate very low. In the researches, it is appearing that, 17% of properties are not pay property taxes, 23% of properties are not pay garbage taxes. The lost caused by these figures is equal to 32% of annually collected taxes.

### 3. ADDRESS INFORMATION SYSTEMS

Information systems are used respect to necessities in different areas. One of these areas is Address Information System (AIS) in which following, querying and displaying of numerating processes are realized in urban information system applications. Meeting of demands to these systems optimally is depending on eliminating of possible problems via pilot projects applications. So, firstly, in this application an AIS design and application realized for Trabzon City, selected as pilot area and then it is aimed that this design and application will be a model for Turkey [Yildirim, 2003].

#### 3.1 Address and Its Components

**Address:** An address is the first essential description of any piece of land for whatever use: residential, commercial, industrial, recreational, or institutional. It is also a more permanent and legally accepted description as compared to other attributes such as use and ownership. In many aspects of public administration, an address is the only way to match various data sources [Lilian et al, 2002].

Most of the things that human society cares about happen at addresses. Where people live, work and play. Where most economic activity takes place. Where crime happens. Where fires occur. Where people are injured. Where goods are bought and sold. Where products are delivered. Where services are rendered. The address allows us to describe these locations in a way that other people can understand. It is a form of shorthand or an index by which the location can be referenced. It can be built into maps and databases that can be used to find the addressed location and to navigate to it.

In GIS databases, addresses are typically stored as address ranges along block faces (one side of a street between intersections). This is a relatively efficient way of storing address information as a large number of addresses can be referenced using relatively few attributes and graphical features. There is also a one-to-one correspondence between the street vectors and the address range descriptions. To locate an individual address, the specific address is interpolated proportionately along the vector representing the address range in which that address is contained [Fisher, 2003].

**Address Components:** Address data composed of multiple qualifiers. These qualifiers are arisen by different operation steps. For example, local governments are responsible for numerating and so determine street name and building number. Post Office determines zip codes and Ministry of Interior determines districts name. Address data has multiple qualifiers such as street name, building number, district name, and zip code i.e.

### 3.2 Determining of an Address Standard

Address formats should be in a standard system for address based information system works. Using standard address format supplies some benefits like working of the system, sending documents to related person, increasing of work speed between the societies and adapting to Europe Union (EU) country's address standard. In this study, the address formats which are used in forty countries are examined and according to sequence of components in address format, an address format was specified for Turkey (Table 1) [Yildirim et al, 2002]. Nowadays, an adapting process continues for membership to EU in Turkey. In this process, EU Country's standards will be applied in Turkey. The address formats used in EU Countries are same. So, this format will be used in near future in Turkey. But, it is seemed that there is not any study about address standard. This research has been made in three societies: Society of GSI, EU adapting committee, TSI (Society of Turkish Standard Institute).

**Table 1.** Determining of address standard [Yildirim et al, 2002]

COMPONENTS	1.(%) Comp.	2.(%) Comp.	3.(%) Comp.	4.(%) Comp.	5.(%) Comp.	6.(%) Comp.	7.(%) Comp.	Absent (%)	Total (%)
Society, Organization, Company Name	92	-	3	-	-	3	2	-	100
Building Numbers and Name	2	52	36	5	5	-	-	-	100
Street Name	-	36	52	5	5	2	-	-	100
Zip Code	-	7	5	61	10	17	-	-	100
District Name	-	-	5	22	51	5	-	17	100
County Name	-	-	-	-	17	27	-	56	100
City Name	6	-	-	-	-	42	52	-	100

According to percentage in Table 1, the address formats are specified for Turkey.

1. Society, Organization, Company Name		<b>For Foreign Countries;</b>		<b>For Turkey;</b>
2. Buildings Number and Buildings Name		Mr. J. Public		Sn. Mehmet ÇETE
3. Street Name		123 Church Street		27 Gül Sokak
4. Zip Code	⇒	61857 Colloyn	⇒	61250 Yomra
5. County Name		PRETORIA		TRABZON
6. City Name		SOUTH AFRICA		TURKEY

### 3.3 An Address-Based Information Systems

The coverages which are in address based information systems were specified and then graphic and non-graphic spatial information of these data were acquired. Respect to this information, databases were designed and related with each other (Figure 1). After required controls had been done, queries and analysis were done in the system. By this system, addresses of important societies and organizations can be queried and displayed in the graphic screen, and also these societies and organizations can be coded on the map via their

addresses. For complete assessment and collection of municipal taxes datasets like buildings, addresses, ownership records are related to other information which creates the base for taxation (like street rates) is linked in spatial database.

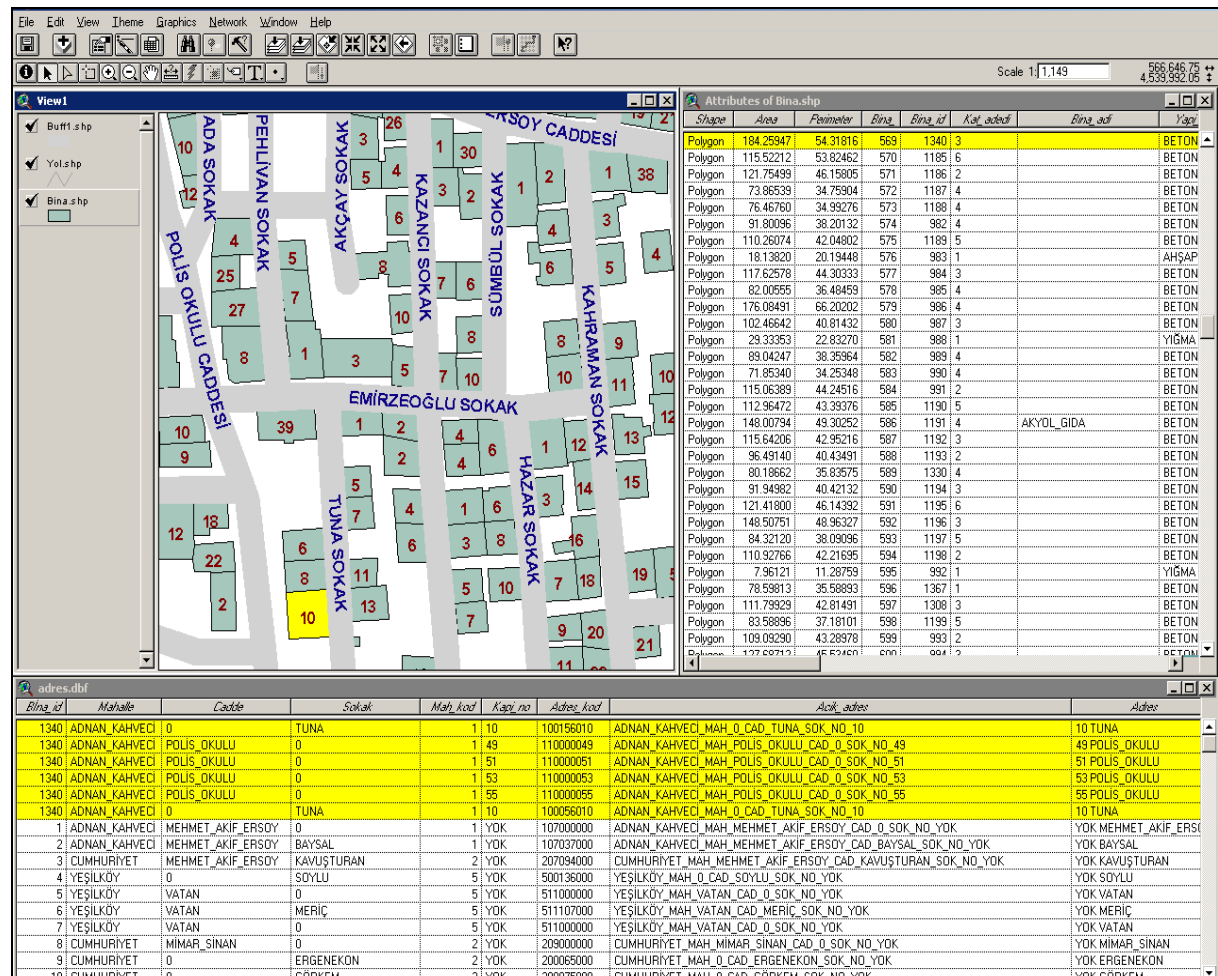


Figure 1. An example of address information systems interface

## 4. TRABZON CITY CASE STUDY

### 4.1. Current Situation

There are approximately 22.332 buildings and 75.604 departments in Trabzon City. Trabzon Municipality planned for property taxes approximately 5.500.000 USD and for garbage taxes approximately 750.000 USD in 2003. But in this year, Trabzon Municipality collected 4.000.000 USD property taxes and 500.000 USD garbage taxes. That is to say, the municipality's annual taxes loss is approximately 1.750.000 USD.

## **4.2. Components of System**

### 4.2.1. Road Coverage

Road is the most important coverage for address information systems. Various kinds of query and analysis about address information can make on the existing road network. The arrangement that is formed by relating building numbers with road starting number and ending number constitutes base of address based information system. Information of road network should be formed with update data. Thus, query and analysis which make on road network give the most accurate results. Road network's database which used network analysis include non-graphic information such as road width, road cover type, road name, road type, drive time, road starting building number and road ending building number. In addition to this, although turn information is not representing in the arc attribute table, turn tables were constituted for this information and related to databases.

### 4.2.2. Building Coverage

One of the most important coverage is also building coverage for address information systems. In this coverage, there is much information such as type, usage type, door number, address information, department information, taxes information, renter information, owner information. Using these data, all sorts of query and analysis could make accurately and quickly.

### 4.2.3. Computing of Property and Garbage Taxes

The main principal of system study is formed property and garbage taxes prices on road network and than these prices are computed in building coverage automatically. So, firstly, property and garbage prices are written in road databases. And then, taxes which are belonging to every building are calculated automatically using to these roads data. Thus, property and garbage taxes are calculated for every building which is licensed. In this way, tax collection processing was implemented in an optimum way (Figure 2).

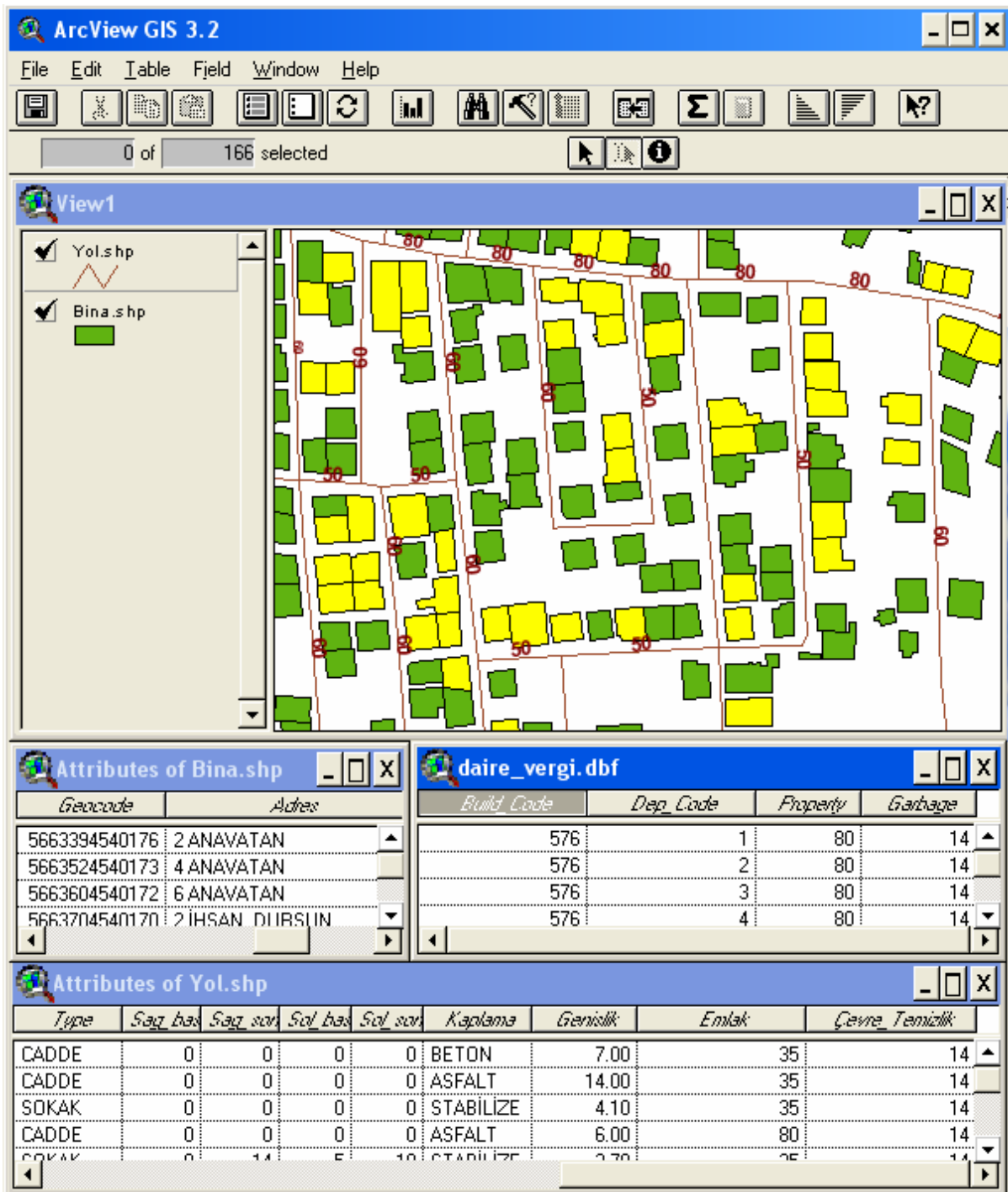
## **4.3. Automatic Declaration**

Using the system property tax bills and garbage tax bills are sent out semi-annually by address data. And consequently, all tax bills are due upon receipt; however you have 30 days to pay your bill without interest or penalties. After the due date interest goes back 30 days or the date of mailing [Yildirim and Yomralioglu, 2004].

## **5. CONCLUSION**

The development of information systems and the accompanying extensive databases, many of them utilizing desktop computers, has created a technological revolution extending directly into property and garbage taxes problem solving. These taxes problems are often characterized as uncertain, complex and dynamic. Solving them, if solutions are possible, is a multiuse process with a strong emphasis on deductive reasoning and decision making, both emphases adopted from the finance and economic disciplines. This article develops a model in order to assess how Address Information Systems may affect collected of property and garbage taxes problem solving. Using the address data and address databases, it was shown

that address based information systems have to contribute to property and garbage taxes problem solving.



**Figure 2.** Computing of property and garbage taxes

Location is an important factor when conducting municipality taxes research. GIS facilitates the creation of many types of variables that can be useful in these taxes analysis. So, in this paper, an implementation of an address-based information system in municipality of Trabzon city of Turkey is explained as a case work with respect to manage a real estate and environmental cleaning tax collection procedures. Real estate values which reflect property characteristics are processed on roads-streets by a GIS network analysis concept. Finally, tax bills which are calculated automatically by this system are sent to related individual addresses to inform them. As a result, a successful property and environmental cleaning tax collection control system is provided and in accordance tax revenue is increased.

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## BIOGRAPHICAL NOTES

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