

The necessity of developing a CAMA System for the Real Estate Market in Greece

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Abstract

This paper summarizes the main characteristics of the Objective Land Mass Valuation System (OLMVS), currently operating in Greece. Existing valuation and taxation techniques are presented along with some considerations for new valuation skills and more reliable and updated data.

Since mass valuation is greatly influenced by statistical models and computer technologies, specifically designed systems, using advanced techniques in software and hardware technologies have started to develop in the 1980's. These Computer Assisted Mass Appraisal (also known as CAMA) systems, can assist and simplify valuation procedures, reducing time and effort required to analyze large numbers of input data concerning determining land valuation.

The development of a CAMA system for the real estate market in Greece is further examined taking into consideration the current needs and changes required in order to adapt the new system to the Greek real estate market. The objective of applying a CAMA system in Greece is to automate and simplify valuation procedures, ensuring fairness within taxation on real estate property, in a rapidly developing land market.

1. Objective Land Mass Valuation System (OLMVS)

1.1. History

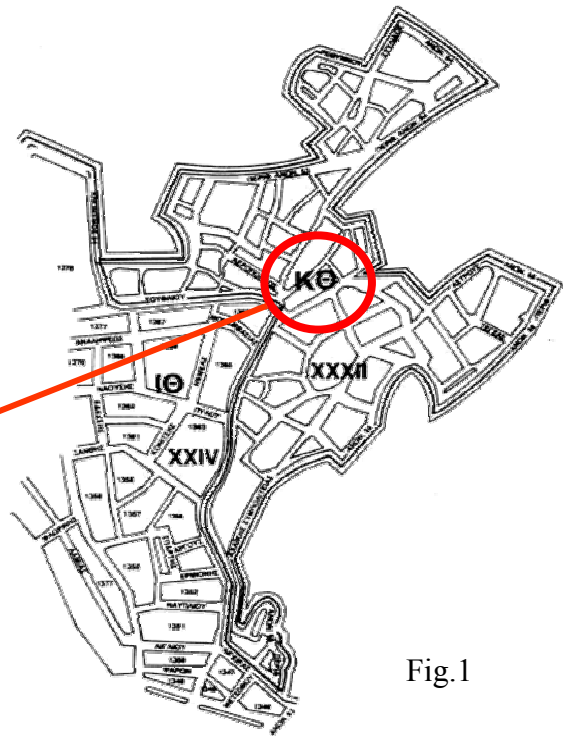
The OLMVS started to develop in 1985 in Greece, according to article 42, Law 1249/1982, for taxation purposes. The system gradually expanded to the whole Greek territory determining the value of real estate on the basis of objective criteria. Since then, land taxes are based on that "objective" valuation also needed when seeking a mortgage, land expropriation values, or when determining the assets of the country.

1.2. Characteristics

According to that system, each municipality is divided into value zones as many as needed to simulate the variation of Real Estate values in the area. An initial basic value per square meter is then assigned to first floor residential apartment for distinct zones in each municipality district, appearing on the relative tables and charts of the Ministry of Finance & Economy (Fig.1). The objective, taxable value V_{OBJ} of each property is the product of the initial value V_{ZONE} multiplied by a number of tabulated factors: $V_{OBJ} = x_{ij} * V_{ZONE}$, where "i" indicates property value factors (parcel size, age of constructions, exploitation coefficient and other attributes of land) and "j" indicates type of property (apartment, parcel, garage, etc).

The real estate transfer tax is imposed on the objective value thus calculated, which could be considered refutable, since no different aspect is referred. If however a contract records a consideration higher than the objective value the tax is imposed on that higher consideration: $V_{TAX} \geq V_{OBJ}$.

Tax rates range in certain intervals; the current transfer tax rate is 7% for objective value of up to 15,000 Euros and 9% for the remaining part above the objective value of the property (when other tax exemptions such as first residence, do not exist). These rates are generally increased by a percentage of 2% when the property is situated in an area covered by a public fire protection service. Certain exemptions from the OLMVS apply in the cases of real estate properties used by industrial, educational, trade or hotel units.



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ΚΗ Ζώνη: ΛΕΩΦ. ΓΛΑΥΚΟΥ - ΑΝΩΝΥΜΟΣ 63 - ΑΝΩΝΥΜΟΣ 14 - ΒΕΛΕΣΤΙΝΟΥ - ΑΚΡΟΤΗ- ΛΙΟΥ - ΑΝΩΝΥΜΟΣ 13 - ΙΒΛΙΟΥ - ΑΝΩΝΥΜΟΣ 62 - ΑΝΩΝΥΜΟΣ 58 - ΕΥΘΟΙΑΣ - ΑΝΩΝΥΜΟΣ 57 - ΓΙΑΝΝΙΩΝΟΣ - ΛΕΩΦ. ΓΛΑΥΚΟΥ	170.000 Δρχ.
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Fig.1

The frequency of revaluation of the OLMVS is specified in legislation (Art. 14, Law 882/90) it should occur at least once every two years, by updating the initial values of the system in each region individually (Table 1).

	01.01.1985	15.03.1986	since 1985	05.01.1987	since 1986	16.08.1988	since 1987	02.01.1991	since 1988	21.01.1993	since 1991	02.10.1995	since 1993	01.01.1998	since 1995	05.03.2001	since 1998
N.Kosmos	85 €	85 €	0%	117 €	38%	220 €	88%	346 €	57%	323 €	-7%	484 €	50%	587 €	21%	939 €	60%
Pagрати	79 €	79 €	0%	109 €	37%	205 €	89%	399 €	94%	382 €	-4%	514 €	35%	616 €	20%	1.086 €	76%
Kolonaki	182 €	182 €	0%	220 €	21%	337 €	53%	722 €	114%	807 €	12%	1.056 €	31%	1.438 €	36%	2.788 €	94%

Table 1

1.3. Critical evaluation

Appraising property in a volatile environment requires a deep understanding of markets, taxes and investments. The Greek system of land valuation does not reflect the country's existing economic environment. The real estate market in Greece has changed dramatically the last few years mostly due to the participation of the country in the European Monetary Union, the implementation of major projects, lower interest rates, and the establishment of new financial instruments such as leasing and real estate funds.

The current situation of the OLMVS is described as follows:

- ✓ Land values estimated by the OLMVS are generally lower than market values, revealing the political character of the system. $V_{OBJ} \ll MV \Leftarrow [V_{OBJ} \cong (0.30-0.70) MV]$ (Fig.2). The reduction coefficient varies according to:
 - i. The time valuation is made in relation to periodical updating of the system
 - ii. The type of property (residence or apartment, store, land parcel, parking place, etc.)
 - iii. The location of the property

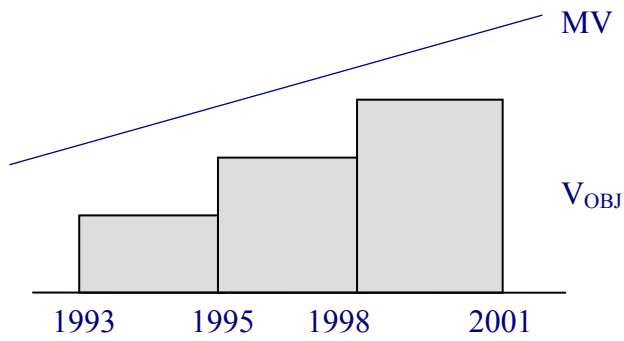


Fig.2. $V_{OBJ} \ll MV$

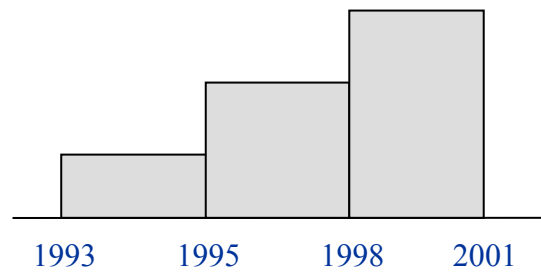


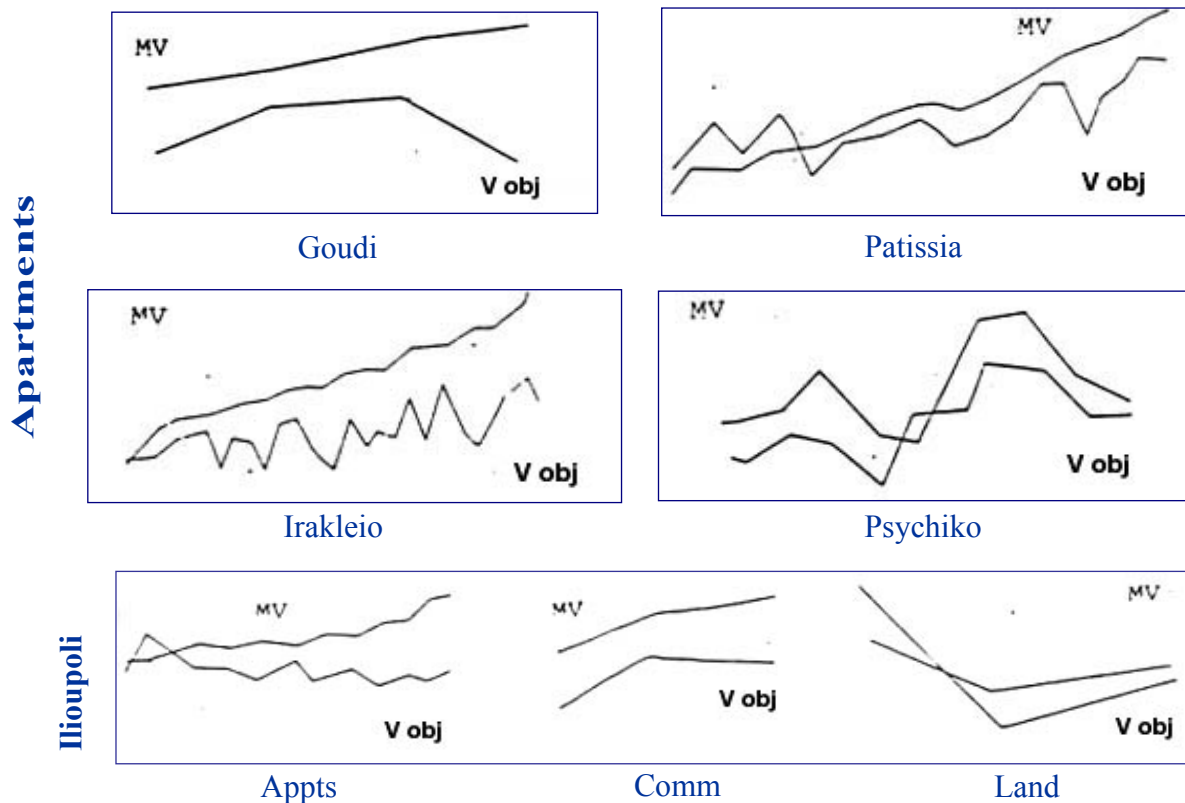
Fig.3. Initial value “jumps”

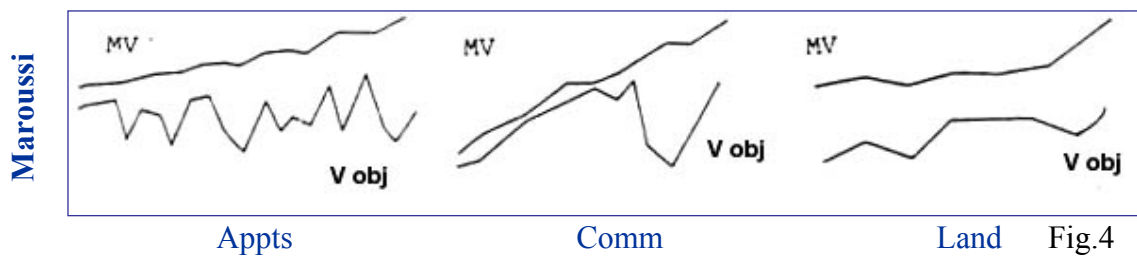
- ✓ The variation mentioned above between “objective” and market values determines new tax rate intervals:

$$TAX = q \cdot V_{OBJ} \Rightarrow TAX = 11\% \cdot (0.3-0.7)MV \Rightarrow \boxed{3.3\% MV < TAX < 7.7\% MV}$$

This mathematic equation shows that in fact a social inequality arises with the current system, since people are asked to contribute to taxation through different percentages.

- ✓ Properties belonging to the same area are appraised on non-flexible criteria, according to the zone’s initial value defined by the Ministry of Finance & Economy. A number of missing parameters such as view and surrounding environment, life span of construction, earthquake calculation and heat insulation factors, not currently included in the system, would significantly improve the property value definition.
- ✓ OLMVS is in fact an unsophisticated, manual-operating system, lacking a dynamic character in monitoring and adjusting to market values on a given moment. As shown on fig.3 for the same type of property, V_{OBJ} / MV ratio varies in different areas as well as for different types of property in the same area.





- ✓ The periodical updating of the system sometimes results in considerable initial value “jumps” (Fig.3). During that periodical updating the Ministry can also change the influence rate of the various property value factors, resulting to a distortion of the system. Therefore, the overall structure and updating of the system:
 - a. Have an impact on the real estate market
 - b. Contribute in generating land policy measures
 - c. Induce political cost
- ✓ The objective value of a property is reduced to 90% when the property is co-owned. A reduced valuation is also applied, when a real estate property is compensated by the state due to a take-over for public benefit.

1.4. Value Added Tax (V.A.T.)

According to article 6 of Law 1642/86, new real estate is subjected to VAT of 18%. The obvious result of the imposition of VAT on the new real estate without first instituting reforms to the current taxation system would be to reduce revenue for the state as follows:

$$q = 11\% > q_{VAT} = 18\% - VAT_{construction}$$

So, even though the percentage of 18% is initially higher than the current coefficient of taxation (max 11%), after the reduction of the VAT on the cost of the new construction, the remaining tax revenue is significantly lower. This problem could be resolved by increasing the objective values so they approach market values: $V_{OBJ} / MV \cong 1$.

$$V_{OBJ, current} \cong (30\%-70\%) MV \rightarrow V_{OBJ, proposed} \cong (80\%-120\%) MV$$

The subjection of real estate to the VAT has been repeatedly postponed, from 1987 until 2005. All indications are that there shall be further postponement, since the 6th community directive allowed each member state to exercise its taxation policy on real estate, in recognition of the practical difficulties that will arise. Of course there are other problems as well concerning the application of VAT on real estate, but sooner or later those problems should be solved, since the long-term aim of the Commission is to impose it to our country. The existing legislative framework must be re-examined and the improvements required must be instituted.

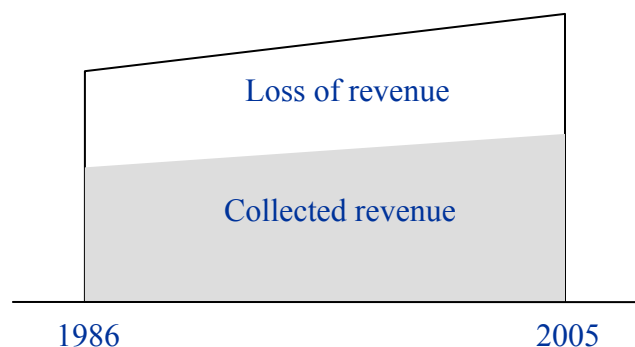


Fig.5

2. Computer Assisted Mass Appraisal

2.1. Appraisal & Mass Appraisal

Appraisal is the act of estimating the price at which a particular property would sell. When valuation takes place for many properties, as of a given date, using standard procedures and statistical testing, we call it Mass Appraisal.

An appraiser has to analyze market data using appropriate research methods in order to identify those supply and demand factors that best explain value for a specific property or for many properties in a specific market.

Mass appraisal requires the development (building and calibration) of a valuation model capable of replicating the forces of supply and demand over a large area, evolved from the three basic valuation theories: comparable sales, cost approach & income approach.

2.2. What is a CAMA system

A Computer-Assisted Mass Appraisal (CAMA) system is an automated system for maintaining property data, valuing property, notifying owners and ensuring tax equity through uniform valuations, also designed to operate independently as part of an automated network

2.3. Components of a CAMA system

a. Data Management

A CAMA system should include procedures for adding, editing and monitoring data within its database and manipulating records and fields, according to the authorized user's needs.

b. Valuation

There are three basic valuation methods within a CAMA system:

i. The Market Approach (Directly by statistical methods)

The market method is widely considered the best indicator of value. It compares the property in hand to others with similar location, size, condition and quality, recently sold. These sales ("comps") must be open market or "arm's-length" sales, meaning that there can be no other relationship between vendor and purchaser than the sale. Two further techniques are available:

Comparable sales (Through clustering algorithms)

There must be in the database at least ten properties sold, not counting any property chosen as the "subject." The assessor decides (based on his knowledge of the market) which factors (property characteristics) are relevant in determining value, assigning each a weight and an adjustment value. The weight indicates how important that factor is in the selection of a comparable property; the adjustment is the monetary amount that must be added to or subtracted from the sale price of a selected comparable property in order to make it resemble the subject as closely as possible.

$$Q_i = wt_1 \cdot dif^2_{x_1} + wt_2 \cdot dif^2_{x_2} + \dots + wt_n \cdot dif^2_{x_n}$$

$$V = V_{\min Q} + (adj_1 \cdot dif_{x_1} + adj_2 \cdot dif_{x_2} + \dots + adj_n \cdot dif_{x_n})$$

The comparable sales approach is useful in estimating values for a small number of properties, but it is cumbersome for large numbers.

Multiple regression analysis

This is a statistical technique for use in cases where one variable in a population is thought to be influenced by several others. The single influenced variable is called the dependent variable. In case of properties, this variable would be the selling price. The variables that influence it are called independent variables. In a property database they would include land size, building size, year built, quality, and a potentially large number of other elements, such as porch area, garage area, air conditioning, and the like.

The variables are assumed to have a linear relationship to each other. That is, the dependent variable Y can be expressed as a function of several independent variables, each with its own coefficient, plus a constant:

$$Y = c + b_1x_1 + b_2x_2 + \dots + b_nx_n.$$

If a considerable number of data are obtained from properties sold in known prices, a well-formed computerized regression program could solve the above equation to determine values for the b and c variables giving the closest approximation to the actual sale prices to all properties under consideration. These coefficients can then be applied to other properties with similar characteristics in the same region that did not sell, with some confidence that they will estimate a plausible market value.

09/23/1998 12:20:10		MicroSolve CAMA System - Comparables Report										Page 1	
Property File: F:\LUSH0224\DATA\VTMAIN.DBF		Subject Record # 138		119 FOX LANE									
20 Sold and Unsold parcels were considered under Comparison Set # 1. (The subject record was excluded from consideration.)													
5 weighted factors were used in the comparables selection. (The difference was raised to a power of 2.)													
Subj. Record	Most Comparable	Next Most Comp.	3rd Most Comp.	4th Most Comp.	5th Most Comp.								
Record No.: 138	72	19	19	182	113								
Parcel I.D.: 212110	202149	202010	202010	212222	212043								
Section I.D.: 1	1	1	2	1	1								
Name/Addr.: 119 FOX LANE	41 RUSTIC COURT	231 WINDING WAY	231 WINDING WAY	1865 LAKE DUNMORE RD	329 MOUNTAINVIE								
# Factor	Fac. Val.	Fac. Val.	Adjust	Fac. Val.	Adjust	Fac. Val.	Adjust	Fac. Val.	Adjust	Fac. Val.	Adjust	Comp.Wt	Adj. Rate
38 Quality	2.00	3.00	-10000	2.00	0	2.00	0	2.00	0	3.00	-10000	10000.00	10000.0
65 Bedrooms	3	2	5000	2	5000	2	5000	4	-5000	4	-5000	2500.00	5000.00
45 Building Sq	616.00	400.00	10800	1326.00	-35500	800.00	-9200	1144.00	-26400	1938.00	-66100	0.25	50.00
43 Year Built	1926	1942	-32000	1940	-28000	1958	-64000	1971	-90000	1972	-92000	400.00	2000.00
64 Total Rooms	4	3	3000	4	0	3	3000	7	-9000	6	-6000	900.00	3000.00
A. Sale Price:	\$75,500	\$85,000		\$91,000		\$91,000		\$88,000		\$132,500			
B. Total Adjustments Above:		\$-23,200		\$-58,500		\$-65,200		\$-130,400		\$-179,100		Mean	Std.Dev.
C. Adjusted Sale Price:		\$61,800		\$32,500		\$25,800		\$-42,400		\$-46,600		\$6,220	\$48,262
D. Comparability Index:		100		96		84		60		38			
E. Mean Weighted by Comparability Index.....:				\$18,994				COV for (C.) =	** %				
F. Factor D:	\$0	\$0		\$0		\$0		\$0		\$0			
G. Units:	\$0	\$0		\$0		\$0		\$0		\$0			
H. Ratio of F/C:		0.0000		0.0000		0.0000		0.0000		0.0000		0.0000	0.0000
J. Std. Deviation of (H.) About 1.0.....:				1.1180									

Fig.6. A sample of a Market Approach Report

In Greece, the Market Approach is very difficult to be applied, since Market Values (when different from Objective Values) are not public, but they remain in the local IRS office archives, chronologically (not topologically) indexed. Still it would better apply in urban areas where many sales (more than 100 needed) take place in a short time period, such as a year. The reason is that it is fundamentally a sampling procedure, in which information derived from a rather small population (sold properties) is generalized to the population as a whole.

ii. The Cost Approach (or Summation Approach)

The cost method is based on the replacement cost of the property. Generally it is only chosen for new construction, especially in older, built-up communities. The assessors estimate the price of labor and materials which would be payable to replace a property with a similar one. They also estimate the value of the land as vacant. If the property is not new, the assessors then determine the amount the property has depreciated and adjust the assessment accordingly.

Houses depreciate at different rates in different areas, depending on weather conditions, building materials, maintenance, and workmanship. Furthermore, perception of house conditions is rather subjective. Each assessor is likely to have his own ideas about how much depreciation a house has undergone. This subjective impression is often called “effective age”.

The value of land is a major contributor to property value overall. Usually this is done by neighborhood. A typical land table might use a square-meter rate plus a constant for each neighborhood, like this. In some cases land type is also important.

Having the components of a complete property cost, we start with building replacement cost, and then subtract depreciation. Finally we add land value. The number we end up with should be closing in the amount for which the property would sell in a free market.

$$MV = Q [LV + (RCN - D)]$$

09/22/1998		MicroSolve CAMA System			Page
Itemized Property Costs					
From Table: MAIN Section 1				Record # 5	
Property ID:	03002111	Building Type:	Single		
Owner Name:	RACINE ALBERT E & PENNY L	Quality:	3.00	AVERAGE	
Parcel Address:	931 SHACKETT RD	Construction:	Studded		
Year Built:	1979	Style:	1.5 Fin		
Effective Age:	15	Total Area:	1656		
Bedrooms:	3	Total Rooms:	6		
Item	Description	Percent	Quantity	Unit Cost	Total
BASE COST					
Exterior Wall #1:	WdSiding	100.00		41.03	
ADJUSTMENTS					
Roof #1:	CompShg	100.00			
Subfloor	Wood				
Floor cover #1:	Allowance	100.00			
Heat/cooling #1:	HW BB	100.00		1.20	
Energy Adjustment	Good			1.07	
ADJUSTED BASE COST			1,656.00	43.30	71,704
ADDITIONAL FEATURES					
Fixtures (beyond allowance of 8)			1.00	720.00	720
Roughins (beyond allowance of 1)				265.00	
Porch #1:	WoodDck/None		288.00	6.79	1,956
Porch #2:	WoodDck/No Data		96.00	11.45	1,099
Basement	Conc-8"		936.00	11.32	10,596
Finished Basement	Minimal		468.00	3.82	1,788
Basement Outside Entrance				887.50	888
Subtotal					88,749
Local multiplier		1.00			
Current multiplier		1.00			
REPLACEMENT COST NEW					90,000
Condition	Very Good				
Physical depreciation		0.10			-9,000
Economic depreciation					
Functional depreciation					
REPLACEMENT COST NEW LESS DEPRECIATION					80,000
LAND PRICES					
NO No Data	Size 3	Nbhd Mult 1	Grade	Depth	
SITE IMPROVEMENTS	Quantity	Quality			
TOTAL PROPERTY VALUE		No Data			79,749

Fig.7. A sample of a Cost Approach Report

The Cost Approach, even though an indirect method, is most favorable to apply in the Greek Real Estate Market.

iii. The Income Approach (based on capitalization)

The income method is used for properties purchased for income profit. It is based on the gain margins of a rented property, determining the amount an investor would pay for that property. In order to make the estimation, current market rents, vacancy rates, operating expenses, taxes, insurance, maintenance, and other costs need to be figured into the calculation.

The owner is willing to recover the cost of this building out of net income over a certain number of years before getting real profits, for a time period of almost ten years. That means that any year, about 1/10th of the building's total value is paid by income. That fraction is called the "capitalization rate," or "cap rate" for short. So we can divide the annual net income by the cap rate and get an amount that represents the total value of the building to that owner.

$$V = I / R$$

c. Sales Analysis

CAMA software should also provide capabilities of displaying, tabulating, maintaining & statistically testing sales data, as well as analyzing ratios and producing reports.

d. Property Tax administration

Finally, administration & processing of assessments, exemptions, tax bills, appeals, building permits, tax delinquencies, as well as project management would be the last integral module of a fully functional CAMA system.

2.4. CAMA Software

2.4.1. Acquisition

Acquisition of CAMA software may vary according to the buyer's needs. It could be:

- ✓ an in-house developed custom application, rather expensive and probably needing a couple of years to evolve
- ✓ a commercially available CAMA system, ready to use, pre-tested, reliable, but not very flexible
- ✓ or a system based on general-purpose software, inexpensive, customizable but very demanding in time and knowledge

2.4.2. Modules

A Commercial CAMA System is built on several modules, covering database management, statistical analysis and reporting, handling of the valuation methods, documentation techniques, etc. The following pictures are captures of the relevant procedures particularly in the well-known Mass Appraisal System "CAMA 2000" from MicroSolve Corporation, which is in operation in the School of Rural and Surveying Engineers.

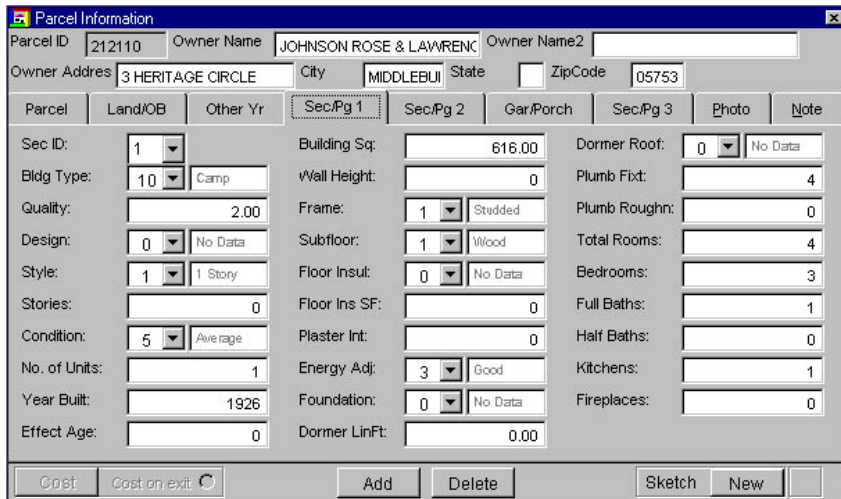


Fig.8. The relational database containing every piece of information on the properties

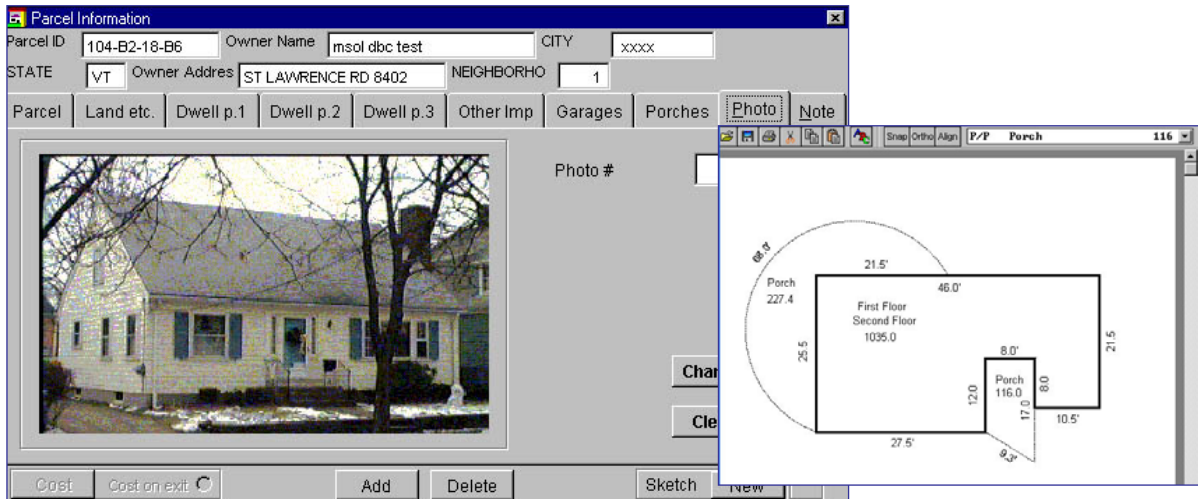


Fig.9. The picture and sketch modules

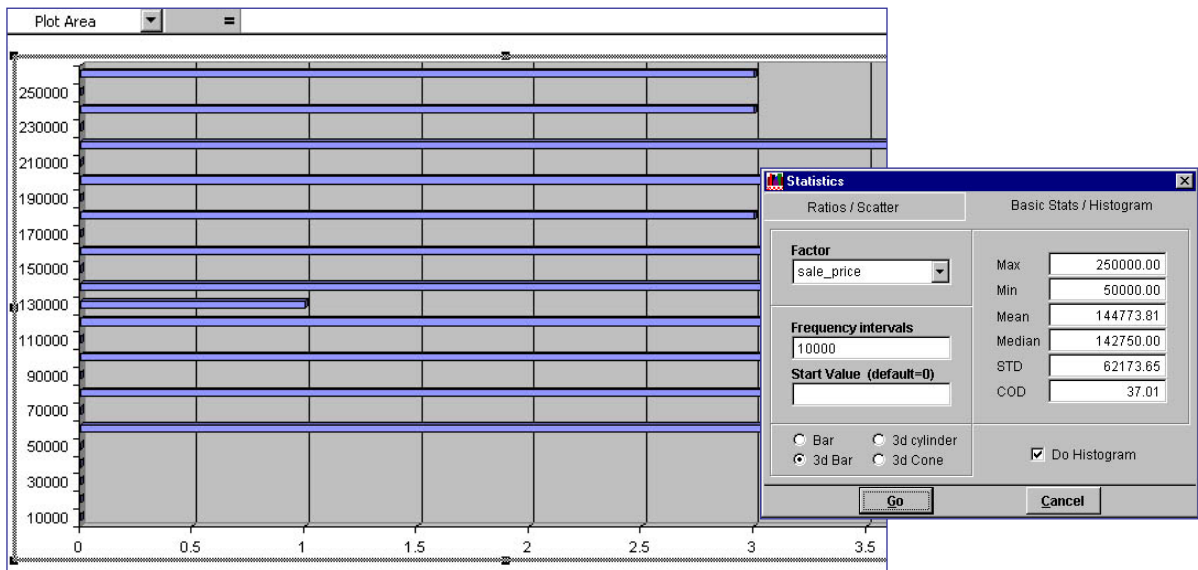


Fig.10. The results of a statistical testing procedure

2.4.3. Integration with GIS

CAMA Systems have evolved over the past years and dramatically reduced the time, effort and expense necessary to value a property. GIS have also evolved from simple environmental planning tools to very sophisticated land records management platforms. The two technologies together provide assessors with the ability to test spatial relationships within the assessment models and more accurately measure positional attributes as a condition of the assessment. Integrating GIS & CAMA electronically relates property, land & building characteristics to map features & locations.

Working with a GIS & CAMA system leads to:

- ✓ organization & aggregation of Cadastral data
- ✓ homogeneous neighborhoods analysis
- ✓ mapping of CAMA data queries
- ✓ indication of Valuation anomalies
- ✓ interactive modification of data

and many more applications becoming feasible, providing critical solutions to the assessor.

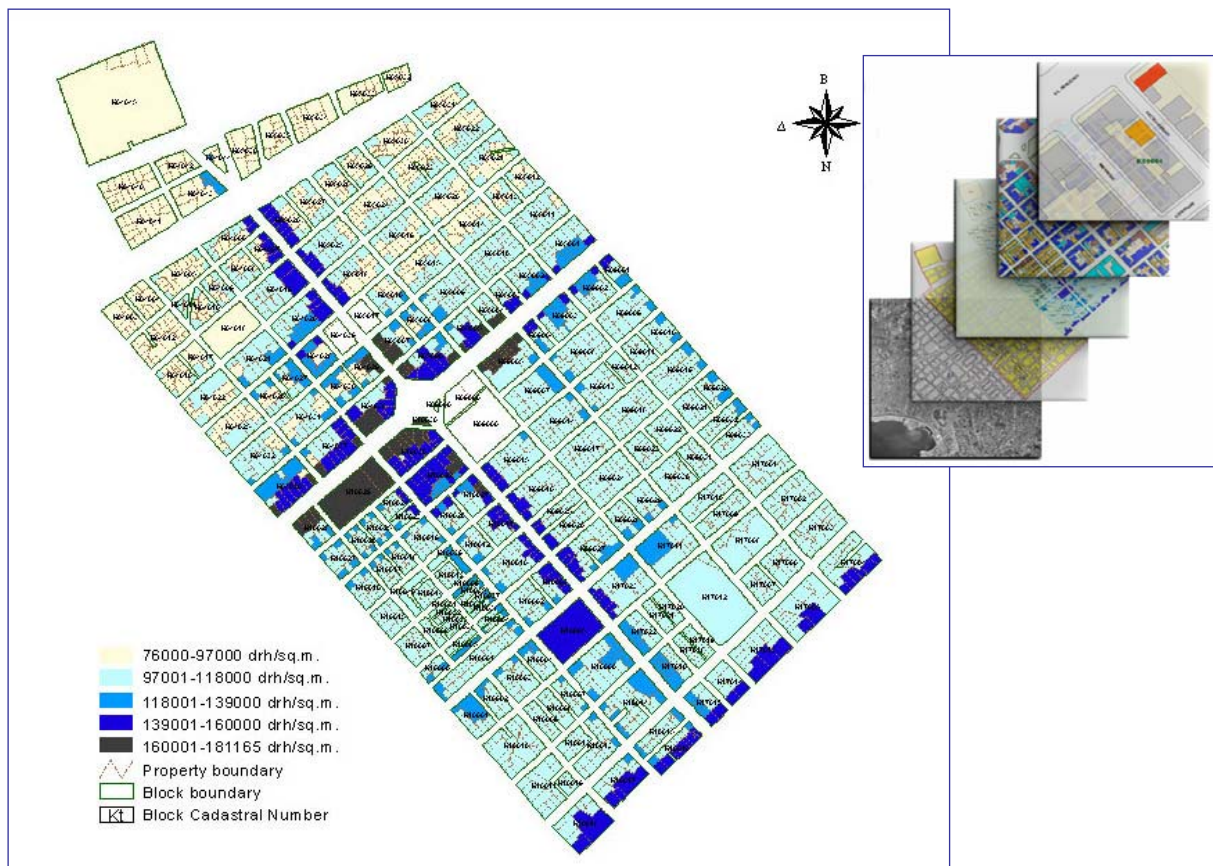


Fig.11. Integration is practically another level, the level of values, overlaid to our Geographic Information System.

2.5. Computer Assisted Mass Appraisal in Greece

2.5.1. Current Assessment Procedures

Currently, individuals or organizations, without any standards or coordination, do the Assessment of Real Estate in the Greek Market:

- ✓ Banks hire freelance assessors to estimate Real Estate value
- ✓ The Corps of Sworn Assessors has its own forms and questionnaires to provide assessments
- ✓ Freelance Real Estate Agents act according to their experience in their local market and
- ✓ Property Consulting Companies, develop their own models and methodologies to simulate the Real Estate Market.

2.5.2. CAMA Gr

What difference can a Greek CAMA system make, and how would it work in the Greek reality?

The Hellenic Cadastre, which is now in progress, would constitute an ideal Land Information System to integrate with the Greek CAMA system for the Real Estate Market. Its database and geographic parcel information enriched with value data could provide accurate mapping interface to CAMA information and serve as a means to simultaneously update both CAMA and GIS data.

The Ministry of Economy & Finance is most suitable to host the new system. The existing taxation software “TAXIS” with its module “KEFALAIO” can be used to feed and update CAMA-Gr, according to the taxpayers’ statements of income and to Real Estate transactions. The system will be operating on a central server of the Ministry, giving on-line access to every IRS office in the Greek territory on various security and authorization levels. So, Real Estate owners or forthcoming buyers can be immediately and accurately informed on certain values, while certified personnel having access to the system’s database can update, modify and manipulate the original data.

Access to the system can also be granted to other interested parties. Real Estate companies, Banks, brokers and development institutions will be able to query the system and to reach a single assessment, to get other cadastral information and to download forms, property cards, or even submit appeals to the IRS.

Consequently, the most important aspect of the system will be that the value of Real Estate will no longer be subject to different assessments, while the market value, the sale price and the tax value will be identical.

3. Conclusions

A transition from the Objective Land Mass Valuation System to a Greek CAMA system would mean:

- ✓ the value of Real Estate will no longer be subject to different assessments, while the market value, the sale price and the tax value will be identical, approaching the assessment from the CAMA system.
- ✓ Uniform assessments for use in every aspect of the economic activity of Greece
- ✓ Irrefutable assessments, since the system is impersonal and based on scientific methodology
- ✓ Social justice with fair land-policy, not-depending on time, place, or other factors

- ✓ “Incorporating valuation and taxation policy, into the general modernization framework developing in Greece”, as Michael Porter said on the 8th of May in Athens
- ✓ “Sales data going public, providing more accurate and just assessments”, as Jan Schreiber said on the 6th of May at the National Technical University of Athens.

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