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The impact of the new airport of Athens on the land values of Eastern Attica

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38th ERSA Congress

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**THE IMPACT OF THE NEW AIRPORT OF ATHENS ON
THE LAND VALUES OF EASTERN ATTICA.**

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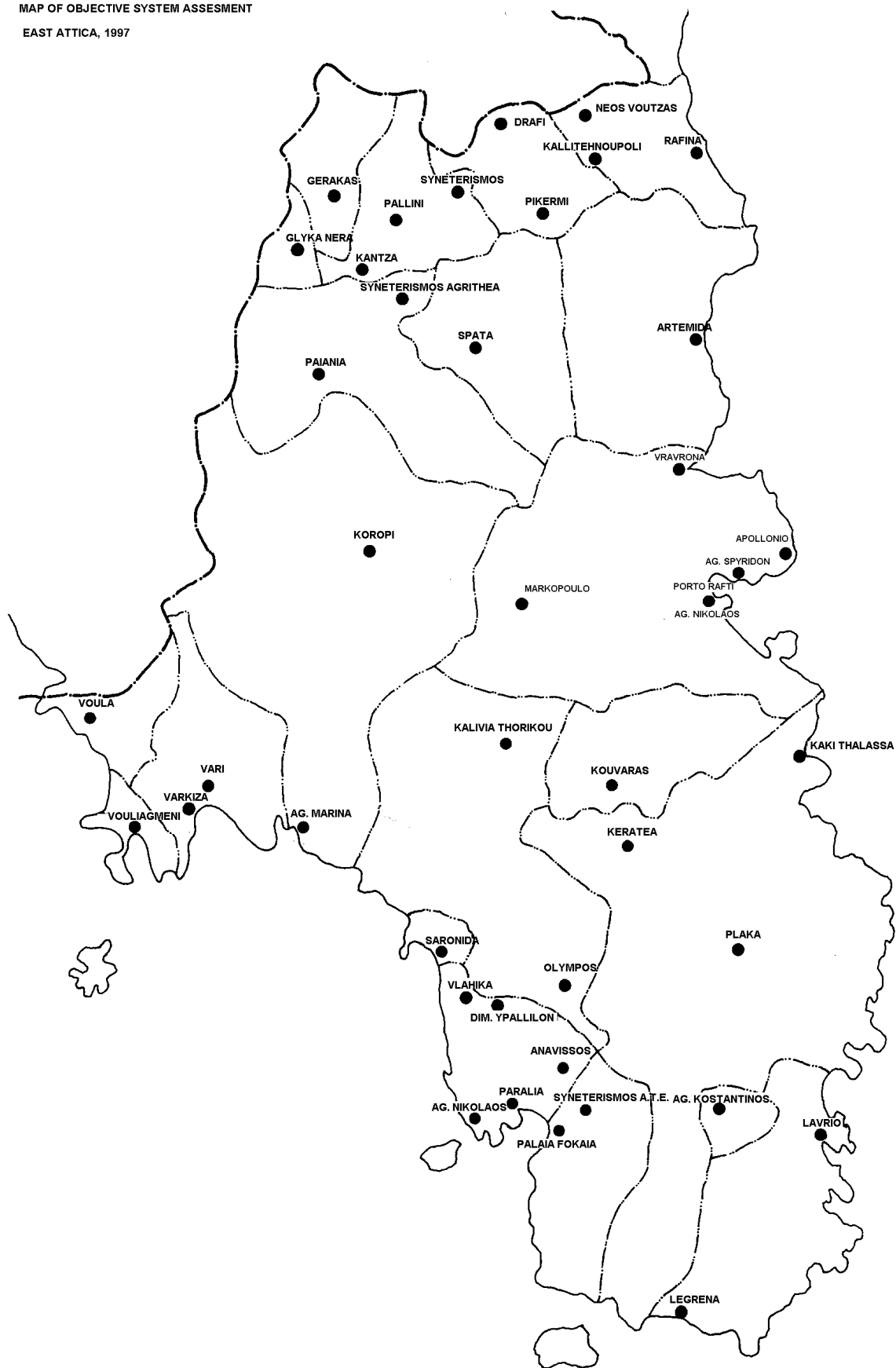
1. SUMMARY

The analysis of the value of the area around 'Eleftherios Venizelos' airport has been based on a survey of the international experience and followed by a quantitative dataanalysis.

The figures of the database come from the Objective System of Assessment (OSA) as well as the Relative Price System of the Pallini and Koropi Revenue Offices (RPSRO). The data was analyzed according to the hierarchical tree method and there has been a detailed reference to the restrictions and the conditions of the data use.

The analysis has been at an horizontal level; that is, we have tried to interpret the increasing decline between the OSA or RPSRO prices and the real prices of land. The ranking system has been based on the functionality of the specific areas. The analysis has been at a vertical level, too; that is, a year by year analysis of the built-up areas which have been grouped geographically. These built-up areas come under the OSA and RPSRO systems.

MAP OF OBJECTIVE SYSTEM ASSESMENT
EAST ATTICA, 1997

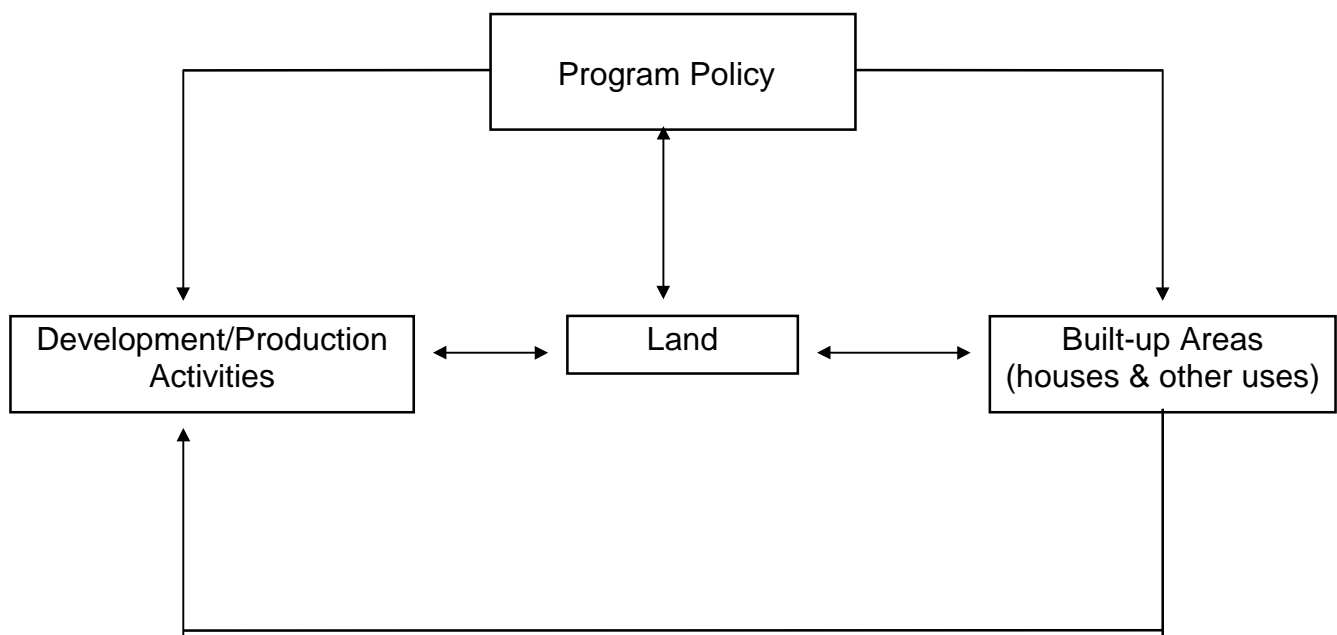


2. THEORETICAL SURVEY

The area of study includes the following 4 systems:

- system of natural resources and environment
- system of built-up areas
- system of production
- system of relations, as it is formed by the programming policy.

The relations and the effects among the systems appear in the following diagram:



At the area of study, the built-up system was affected by the development of:

- old built-up areas and areas of arbitrary constructed main houses along the avenues leading to Lavrion, Marathon and Markopoulon,
- country houses on the coasts of the South Evoíkos and Saronikos Gulfs,
- newly built-up areas as further suburbs of Athens, most of them established by civil societies.

The development/production activities consisted of manufacturing units on the avenues leading to Lavrio, Marathon, Markopoulon and Koropi-Vari. The agricultural sector has declined especially after the expropriation of the land for the airport.

It is noteworthy that during the last years, there has been a significant development in the services sector (exhibition halls, R & D centers, etc.), the constructions as well as the external economies due to the increasing bustle at the ports - the Rafina Port has been the second busiest after Piraeus Port.

However, the area of study is a typical example of formal (industries, exhibit halls, research centers, inhabitants of middle and upper income) and informal workshops, arbitrary built-up houses) economies.

The planning/programming policy affects the economy and the environment, too.

The policy aims at affecting the civil productivity and specialization as well as providing of infrastructure and the ensuring of environmental sustainability.

Despite the criticism against the environmental planning, the economic program with the two European Support Frames (ESF) 1989-93 and 1994-99, has started playing its own important role. The decision for building a new airport in the Messogia which was made by the State in late 1970's and the first steps in order to realize it in early 1980's, are the links between the two programs. Planning, is the main role for land disposal and it must co-ordinate the following three strategic tools:

- a. Adaptation of the use of land
- b. Increasing the income and the autonomy of the local authorities
- c. Quantitative and qualitative increase of the infrastructure.

These tools can contribute significantly to the development of the wider area and the improvement of productivity under the following conditions:

- wide and real liberalization of economic activities in relation with the legislation
- the pressures exerted on the programming of the public sector
- the rejection of the prices self-adjustment system at low levels as non-realistic.

After taking into consideration the fact that the "Eleftherios Venizelos" airport meet the crossroad of the European transportation networks, the area of study can be

characterized more as a decentralized and less as a compact city. A compact city is densely built with houses and the professional occupation is gathered in small and big centers. A decentralized city can have unlimited suburbs while housing and occupations are spread. A compact city is distinguished for the quality of the transportation system while a decentralized city for the volume of transportation.

The relations of the regional systems depend on:

- the needs of the infrastructures
- the effect on the surrounding; the smaller they are, the interactions are more positive.

In the case of the International airport, the above mentioned conditions are not in force and the area faces serious needs in infrastructure. The international airway Baltimore/Washington has the same characteristics as the "Eleftherios Venizelos" airport - close to the metropolis, expected concentration of industries and offices - and high demand for housing increases their price. In order to meet these and other problems like the changes in the local labor market and the definition of the transportation needs, the authorities of the former area were obliged to organize an informal observation committee which consisted of:

- development & function executives of the airport
- representatives of the production field
- land owners
- representatives of the national & local authorities
- executives of the transportation organizations

The advisory role of the committee ensures the quick response to problems identical to the ones appearing in our area of study, like mass purchase of land by big investors and efforts to change the use of land, especially in protected areas (e.g. mountainous areas).

The location of the airport at the area of study is expected to change the rural area into an urban one.

The pricing system of the area has already defined the limits between the rural and urban area. The former is defined by the RPSROs and the latter by the OSA.

The increase of demand for rural land, increases the competition and has a serious impact on the prices. To be more specific, the impact of the factors of demand can be defined by the following function:

$$P = F(LU, VB, LOC, S)$$

P = Prices of Rural Area

LU = Variables of Land Use

VB = Value of Buildings

LOC = Location Factors

S = Size of Demanded Land

In case of Messogia:

P is expressed in prices of RPSROs

LU is expressed through the existing and proposed land planning policy

VB is expressed in OSA prices

LOC refer to the distance among the main land planning factors

S stand for the size of the free from restrictions land.

The high prices of rural land reflect the expectations for future urban uses. These expectations are defined in value and time units by the existing and proposed land and the building planning policy.

3. ANALYSIS OF LAND VALUES AT THE AREA OF STUDY

3.1 *Methodological approach*

The area of study is a typical example of the what theories define as a "rural urban area". Due to this fact, the value of land is represented through two independent systems:

- * The Objective System of Assessment (OSA). The OSA was created in 1988, changed in 1993 and were completed in 1995. The last revision was done in 1997. The system covers most of the main traditional built up areas as well as new ones which were created by civil co-operatives during last years.
- * The Relative Price System has been formed by the local Revenue Offices and depends on the continuous transfers of land which is not in the OSA zones.

The former system is in force for buildings (reflects the price for 1sq.m of a flat in the 1st floor) while the latter for land. In both cases, the real prices paid by the buyers are far away from the OSA ones.

A detailed survey of the land prices in the area of study, must be divided into smaller areas according to the applied pricing system. This method will permit a general ranking of the area according to the land value based on data provided by the OSA and POs as well as dendrograms.

Sources:

- a. The RO's price data has been taken by the Revenue Offices of Pallini and Koropi.
- b. The OSA price data has been taken by the Ministry of Economics.

3.2. *The Data Base*

The data base is presented in the following tables:

Table 1: Land values from Objective System of Assessment

Years 1993, 1995, 1997

AREA	1993	1995	1997
KOROPI	90.000	145.000	190.000
PAIANIA	100.000	160.000	210.000
GLYKA NERA ⁽¹⁾		165.000	210.000
GERAKAS ⁽¹⁾	85.000	165.000	220.000
SPATA	80.000	170.000	230.000
PALLINI	100.000	180.000	220.000
PALLINI-KANTZA	115.000	220.000	280.000
PALLINI-SYNETERISMOS	75.000	210.000	250.000
RAFINA	90.000	220.000	330.000
RAFINA-KALLITEHNOUPOLI	110.000	245.000	330.000
RAFINA-NEOS VOUTZAS	115.000	230.000	280.000
ARTEMIS ⁽¹⁾	100.000	180.000	220.000
MARKOPOULO	95.000	175.000	210.000
MARKOPOULO-VRAVRONA	150.000	265.000	370.000
MARKOPOULO-APOLLONIO	165.000	325.000	480.000
MARKOPOULO-AG. SPYRIDON	145.000	230.000	310.000
MARKOPOULO PORTO RAFTI		210.000	240.000
MARKOPOULO-AG. NIKOLAOS	145.000	230.000	310.000
PIKERMI		250.000	330.000
PIKERMI-DRAFI	110.000	250.000	330.000
PIKERMI-A.O.O.A.		200.000	280.000
PIKERMI-AG.SPYRIDON		175.000	240.000

Table 2: Land values from Relative Price System of Revenue Offices

Years 1993, 1997

Area	RO	Year	Min	Max	Average
Ag. Ioannis-Spata	Koropi	1993	10.050	12.050	11.050
Ag. Ioannis-Spata	Koropi	1997	17.030		17.030
Ag. Nikolaos-Peania	Koropi	1993	4.653		4.653
Ag. Nikolaos-Peania	Koropi	1997	9.717	10.000	9.859
Ag. Serafim-Spata	Koropi	1993			
Ag. Serafim-Spata	Koropi	1997	12.550	13.760	13.155
Ag. Trias-Markopoulo	Koropi	1993			
Ag. Trias-Markopoulo	Koropi	1997	7.895		7.895
Ag. Trias-Rafina	Pallini	1993			
Ag. Trias-Rafina	Pallini	1997			
Anthousa - Pallini	Pallini	1993	20.000	40.800	30.400
Anthousa - Pallini	Pallini	1997	32.600	39.000	35.800
Artemis-koropi ⁽¹⁾	Koropi	1993			
Artemis-koropi ⁽¹⁾	Koropi	1997			
Artemis-Markopoulo ⁽¹⁾	Koropi	1993	2.547		2.547
Artemis-Markopoulo ⁽¹⁾	Koropi	1997			
Artemis-Spaton Ave	Koropi	1993	9.900	14.000	11.950

Area	RO	Year	Min	Max	Average
Artemis-Spaton Ave	Koropi	1997	15.260	24.380	19.820
Bourboutsana-Koropi	Koropi	1993	2.430		2.430
Bourboutsana-Koropi	Koropi	1997	3.851	5.600	4.726
Christoupoli-Spata	Koropi	1993	4.500	13.500	9.000
Christoupoli-Spata	Koropi	1997	6.500	8.000	7.250
Gargitos-Gerakas ⁽¹⁾	Pallini	1993			
Gargitos-Gerakas ⁽¹⁾	Pallini	1997			
Hamolia-Markopoulo	Koropi	1993			
Hamolia-Markopoulo	Koropi	1997	16.000	16.834	16.417
Kallitehnoupoli-Rafina	Pallini	1993			
Kallitehnoupoli-Rafina	Pallini	1997			
Kamilafi-Koropi	Koropi	1993			
Kamilafi-Koropi	Koropi	1997	5.521		5.521
Karelas-Koropi	Koropi	1993	20.473		20.473
Karelas-Koropi	Koropi	1997	22.499	25.551	24.025
Kokkinaras-Koropi	Koropi	1993	2.232	7.500	4.866
Kokkinaras-Koropi	Koropi	1997	3.500		3.500
Kokkino Limanaki-Rafina	Pallini	1993	22.000	26.500	24.250
Kokkino Limanaki-Rafina	Pallini	1997	32.980	55.000	43.990
Koulidas-Markopoulo	Koropi	1993	5.714		5.714
Koulidas-Markopoulo	Koropi	1997	6.657	8.600	7.629
Marathonos Ave-Rafina	Pallini	1993	10.200	15.000	12.600
Marathonos Ave-Rafina	Pallini	1997	16.000		16.000
Nea Velanideza-Spata	Koropi	1993	7.760	10.180	8.970
Nea Velanideza-Spata	Koropi	1997	12.100	14.000	13.050
Palaia Velanideza-Spata	Koropi	1993	13.000	16.190	14.595
Palaia Velanideza-Spata	Koropi	1997			
Palaos Milos-Pikermi	Pallini	1993	8.200		8.200
Palaos Milos-Pikermi	Pallini	1997			
Patima-Markopoulo	Koropi	1993	3.228	12.122	7.675
Patima-Markopoulo	Koropi	1997	4.000		4.000
Synorezi-Markopoulo	Koropi	1993			
Synorezi-Markopoulo	Koropi	1997			
Varabas-Markopoulo	Koropi	1993	2.285	2.450	2.368
Varabas-Markopoulo	Koropi	1997	3.494		3.494
Velanidia-Rafina	Pallini	1993	10.500	13.500	12.000
Velanidia-Rafina	Pallini	1997	16.000	17.000	16.500
Voutzas-Ag. Varvara-Rafina	Pallini	1993	11.550	10.300	10.925
Voutzas-Ag. Varvara-Rafina	Pallini	1997	20.380		20.380

Comments to the tables:

1. These municipalities were communities until 1993.
2. The prices are in drachmas (GRD). The RO per squared meter of land and present the average of lowest and highest prices and the OSA per squared meter of a flat in the 1st floor (presented the max prices of the system).

3. Approximately - rounded up to one decimal figure.

The selection of years of study 1993 and 1997 - was based on data available and the fact that they were years of change for OSA prices. In 1993 actually started the construction of the airport, and in 1997 the construction works were essentially developed.

The lack of RO data for some years and areas, come from the lack of land transfer due to expropriation (e.g. Ag. Serafim area in Spaton Municipality)

The main criterion for selecting a source of data, was the completeness and the potential for diachronic comparisons.

It should be clarified that the RO prices refer to relative prices data, as they result from tax negotiations in cases of building transfers which are not covered by OSA. For this reason, these RO prices are lower than the real OSA ones which are defined ad hoc for each zone.

The areas which are within or next to the airport zone with available data are:

- ⇒ Kamilafi (Municipality of Koropi)
- ⇒ Patima (Municipality of Markopoulo)
- ⇒ Varabas (Municipality of Markopoulo)
- ⇒ Kokkinaras (Municipality of Koropi)
- ⇒ Ag. Ioannis (Municipality of Spata)
- ⇒ Ag. Trias (Municipality of Markopoulo)
- ⇒ Patima (Municipality of Markopoulo)
- ⇒ Christoupoli (Municipality of Spata)

The areas which are within or next to the airport zone and with not available data are:

- ⇒ Boukourima
- ⇒ Asprocampos
- ⇒ Zikou (Municipality of Koropi)

⇒Palia Braona (Municipality of Koropi)

⇒Vathi Pigadi (Municipality of Koropi)

⇒Progaidouri

⇒Ag. Giourgia

⇒Nerokratima (away from the zone)

⇒Tsalmeza (away from the zone)

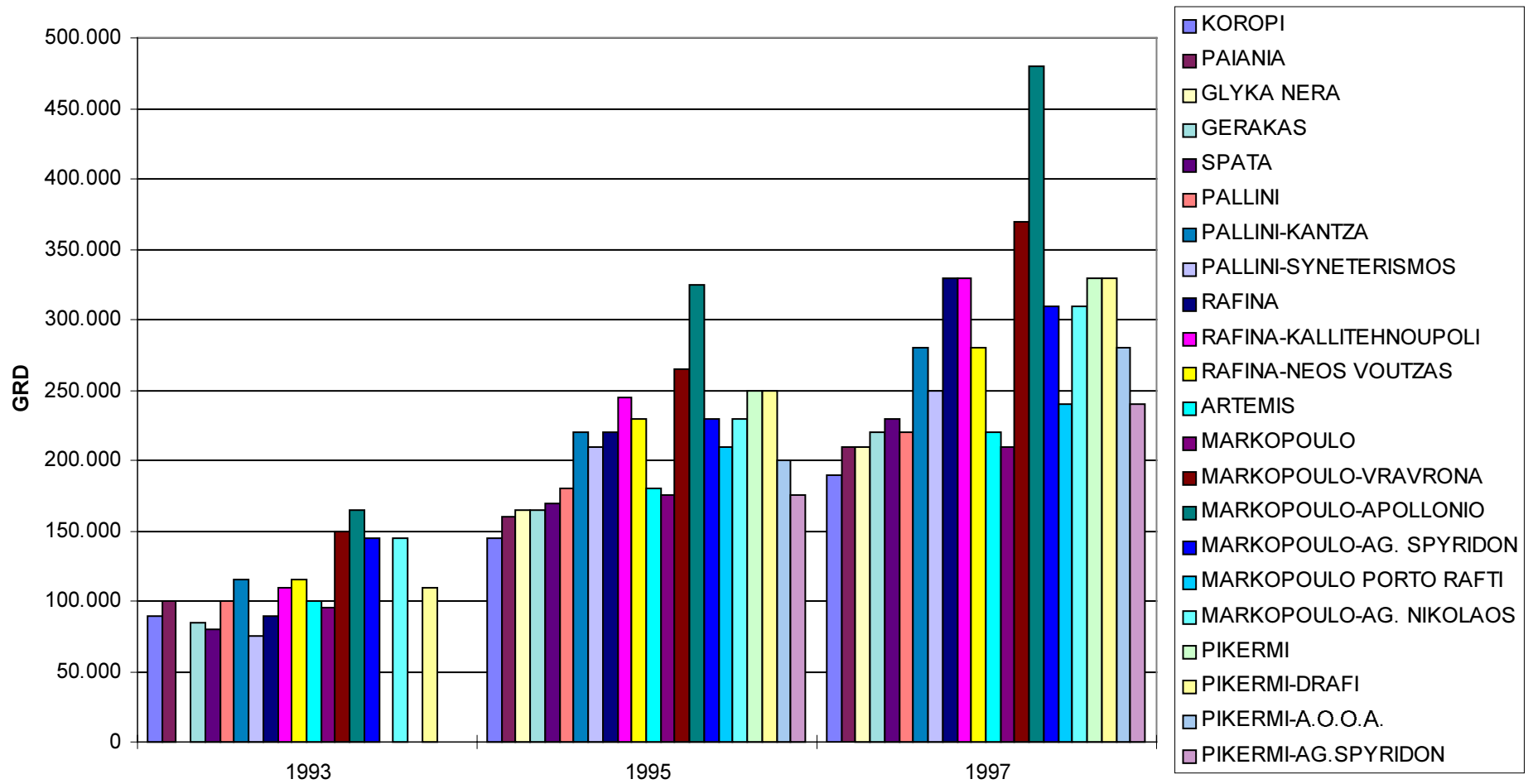
The built-up areas which are in the wider area of study and it was impossible to find data are:

⇒Thea (Municipality of Markopoulon)

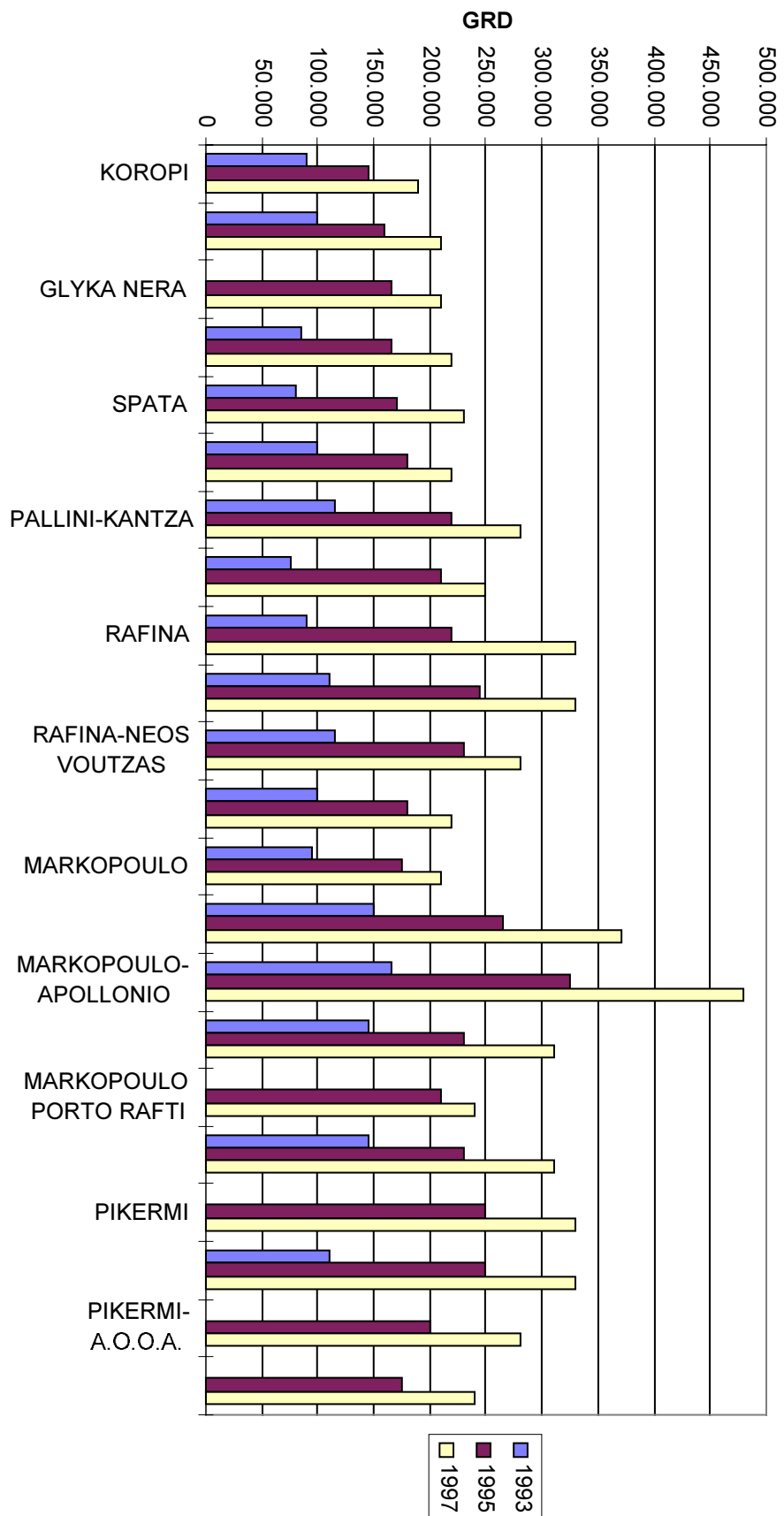
⇒Poria (Municipality of Markopoulon)

⇒Achladia (Municipality of Markopoulon)

Objective System of Assesment



Objective System of Assessment



3.3. Description of the statistical method of data analysis

The analysis of price data in the table results from the land value dendrograms per built-up area in relation to the OSA and RO prices. At this stage, we enriched the analysis with a statistical method which will group the areas in homogeneous categories, after taking into consideration some common characteristics. These characteristics constitute the grouping criterion and refer to the land prices taken from OSA and ROs. During the elaboration of methodology, these prices were the variables while the areas of study were the units or cases. The computer program was SPSS ver8.0 for Windows. As far as the method is concerned, we used the hierarchical cluster analysis; its name comes from the fact that the units or cases are grouped in bigger and bigger clusters until they form one cluster. In carrying out our study according to this method, we selected the between groups linkage, combining groups in such a way that minimizes the squared distance between all the pairs of units - cases. For calculating the distances, we used the squared Euclidean distance according to which, the distance between two units-cases is equal to the total of the squares of the distances for the rates of each variable. The results of this method appear on a dendrogram which presents the combinations of groups in a hierarchical form and the prices of the coefficients at each stage. The dendrogram redefines the distances by adopting a numerical rank from 1 to 25.

3.4. Potentials and restrictions of the analysis

Despite the obvious importance of the cluster analysis system, we must make reference to the following admissions and restrictions which were made, in order to have a trustworthy interpretation of its results.

- * we must take into consideration all the above mentioned restrictions which refer to the sources and especially the non-comparison between the OSA and RO data; this fact led us to distinguish the available data into two categories and to implement the same method four times, two times per source (first for OSA data 1993, second for OSA data 1997, third for RO data 1993 and RO data 1997. In this way, we made four dendrograms which present the grouping diachronically for years 1993 and 1997.
- * The fact that we were obliged to use average prices (lowest + highest price / 2) may have a negative effect on the liability of this study because we have unweighted cases. Consequently, if the RO lowest price is DRS 1,500 and the highest DRS 20,000/sq.m. the average will not be representative if the lowest price was an isolated case.
- * In addition, the lack of data about land value for some areas and some years - due to lack of transfer acts because of expropriation - was the reason for not including some areas in this study. This phenomenon was very intense in 1995 for RO data. To be more specific, the accepted and the rejected cases are the following:

Year Source	1993	1997
OSA	17 accepted 5 rejected	22 accepted 0 rejected
ROs	27 accepted 11 rejected	28 accepted 10 rejected

Since this analysis covers the- minimum of statistical conditions for liability and after comparing it with other parts of this study, we consider it as a reliable record of the contemporary trends.

4. RANKING OF THE SMALLER AREAS ACCORDING TO LAND VALUE

In this study, the analysis of the smaller areas according to land value is made at two levels:

- vertical level; there can only be one general comparison between the smaller areas of OSA and ROs for the same reference year.

- horizontal level; there is an analysis of the corresponding smaller areas of OSA and ROs for the years 1993 and 1997.

4.1. Analysis at a vertical level

Generally, we can mention that the built-up areas of OSA and the taxpayers of ROs are grouped in big categories with small variations for the three/two reference years.

To be more specific, the taxpayers of RPSROs are grouped in almost the same way as the ones in the built-up areas of OSA for the year 1993. In both cases, the body of the groups consists of traditional built-up areas (municipalities) located at a central and the surrounding region .

The difference appears in special categories of new built-up areas, civil co-operatives and areas on the coasts of the South Evoikos and Saronic Gulfs.

In 1993, when OSA was revised for first time and the final decision for the construction of the Airport was made, the grouping criteria of OSA and ROs for the built-up areas were broadened. In the case of OSA, the grouping system appears three groups of built-up areas one with leisure areas and one with the traditional centers and one group with the newly built-up areas (first year in the OSA). The ROs, follows geographical criteria (e.g. groups of cities on main roads or areas further from main roads.

The year 1995, OSA revised for the second time, a more completed geographical grouping of the built-up areas, especially the area near the airport and on the way from Athens. The year 1997, OSA is revised for the third time, while the construction of the airport is in full progress. In the dedrofram from OSA data creates two main groups. The one with resorts and the other with traditional centers.

4.2. Analysis at an horizontal level

As far as the OSA built-up areas are concerned, we can see a grouping tendency from the traditional areas to the areas on the way Athens-Spata and Athens-Rafina-Evoikos Gulf. Also, the distance among the small built-up areas is getting shorter and shorter and we can conclude that the region will be homogenized in the near future.

As far as the price system of the ROs is concerned we would like to mention the following:

- the evolutionary grouping according to their functionality is the main characteristic
- the functionality is located at the change of rural areas to housing suburbs or areas of production and sparse housing - the areas which are nearby the airport were homogeneous until 1993 and then they became differentiated.
- opposed to the OSA areas, the small built-up areas of the RO system, the differences in land value are in an evolutionary progress.

Dendrogram - OSA 1993

* * * * * H I E R A R C H I C A L C L U S T E R A N A L Y S I S * * * * *

Dendrogram using Average Linkage (Between Groups)

		Rescaled Distance Cluster Combine					
C A S E		0	5	10	15	20	25
Label	Num	+-----+-----+-----+-----+-----+					
Rafina-Kallitehnoupo	18	-+					
Pikermi-Drafi	20	-+-----+					
Pallini-Kantza	16	-+	I				
Rafina-Neos Voutzas	19	-+	+-----+				
Spata	5	-+---+	I				I
Pallini-Syneterismos	17	-+	I	I			I
Pallini	6	-+	+---+				I
Artemis	8	-+	I				I
Paiania	2	-+	I				I
Koropi	1	-+---+					I
Rafina	7	-+					I
Markopoulo	9	-+					I
Gerakas	4	-+					I
Markopoulo-Ag. Spyri	13	-+					I
Markopoulo-Ag. Nikol	15	-+---+					I
Markopoulo-Varavrona	11	-+	+-----+				
Markopoulo-Apollonio	12	-----+					

Dendrogram - RPSRO 1993

* * * * * H I E R A R C H I C A L C L U S T E R A N A L Y S I S * * * * *

Dendrogram using Average Linkage (Between Groups)

		Rescaled Distance Cluster Combine					
C A S E		0	5	10	15	20	25
Label	Num	+-----+-----+-----+-----+-----+					
Diakou Mandres-Rafin	571	-+					
Ag. Andreas-Peania	587	-+					
Nea Velanideza-Spata	396	-+					
Christoupoli-Spata	428	-+					
Patima-Markopoulo	172	-+					
Palaaios Milos-Pikerm	252	-+---+					
Voutzas-Ag. Varvara-	268	-+	I				
Ag. Ioannis-Spata	364	-+	I				
Loutro Pallinis	507	-+	I				
Artemis-Spaton Ave	444	-+	+---+				
Perivolaki-Rafina	523	-+	I	I			
Velanidia-Rafina	300	-+	I	I			
Marathonos Ave-Rafin	348	-+	I	I			
Palaia Velanideza-Sp	412	-+---+	I				
Ag. Panteleimon-Pean	603	-+	+-----+				
Kokkinaras-Koropi	60	-+	I				I
Varabas-Markopoulo	124	-+	I				I
Bourboutsana-Koropi	92	-+	I				I
Artemis-Markopoulo	156	-+	I				I
Liofiti-Spata	539	-+-----+					I
Koulidas-Markopoulo	140	-+					I
Stamala-Koropi	475	-+					I
Ag. Nikolaos-Peania	220	-+					I
Anthousa - Pallini	236	-+-----+					I
Balana-Gerakas	459	-+	+-----+				
Karelas-Koropi	44	---+---+					
Kokkino Limanaki-Raf	332	---+					

Dendrogram - OSA 1997

* * * * * H I E R A R C H I C A L C L U S T E R A N A L Y S I S * * * * *

Dendrogram using Average Linkage (Between Groups)

		Rescaled Distance Cluster Combine					
C A S E		0	5	10	15	20	25
Label	Num	+-----+-----+-----+-----+-----+					
Markopoulo-Porto Raf	14	++					
Pikermi-Ag. Spyridon	22	++					
Pallini-Syneterismos	17	++					
Glyka Nera	3	++					
Markopoulo	9	++					
Paiania	2	++					
Spata	5	++					
Pikermi	10	++-----+					
Pallini	6	++	I				
Artemis	8	++	I				
Gerakas	4	++	I				
Koropi	1	++	I				
Rafina-Neos Voutzas	19	++	++++-----+				
Pikermi-A.O.O.A.	21	++	I				I
Pallini-Kantza	16	++	I				I
Rafina-Kallitehnoupo	18	++----+	I				I
Pikermi-Drafi	20	++	I	I			I
Rafina	7	++	++----				I
Markopoulo-Ag. Spyri	13	++	I				I
Markopoulo-Ag. Nikol	15	++	I				I
Markopoulo-Varavrona	11	-----+					I
Markopoulo-Apollonio	12	-----+					

Dendrogram - RPSRO 1997

* * * * * H I E R A R C H I C A L C L U S T E R A N A L Y S I S * * * * *

Dendrogram using Average Linkage (Between Groups)

		Rescaled Distance Cluster Combine					
C A S E		0	5	10	15	20	25
Label	Num	+-----+-----+-----+-----+-----+					
Diakou Mandres-Rafin	575	++					
Ag. Andreas-Peania	591	++					
Ag. Serafim-Spata	384	++					
Nea Velanideza-Spata	400	++					
Loutro Pallinis	511	++					
Hamolia-Markopoulo	208	+++					
Velanidia-Rafina	304	++ I					
Marathonos Ave-Rafin	352	++ I					
Ag. Ioannis-Spata	368	++ +---+					
Perivolaki-Rafina	527	++ I I					
Voutzas-Ag. Varvara-	272	++ I I					
Artemis-Spaton Ave	448	++ I I					
Ag. Panteleimon-Pean	607	+++	+-----+				
Karelas-Koropi	48	++ I					I
Ag. Nikolaos-Peania	224	++ I					I
Stamala-Koropi	479	++ I					I
Ag. Trias-Markopoulo	112	++ I					I
Koulidas-Markopoulo	144	++-----+					I
Christoupoli-Spata	432	++					I
Kokkinaras-Koropi	64	++					I
Varabas-Markopoulo	128	++					I
Kamilafi-Koropi	32	++					I
Liofiti-Spata	543	++					I
Bourboutsana-Koropi	96	++					I
Patima-Markopoulo	176	++					I
Kokkino Limanaki-Raf	336	+++					I
Chilistra-Markopoulo	495	++ +-----+					
Anthousa - Pallini	240	---+					

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