

# Land Uses: Anything Anywhere & Anytime? Yes, but How Thematically and Where Areally?

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## 1 ABSTRACT

The development of Athens from the beginning of the 19th century and particularly after the arrival of 400.000 refugees from the Asia Minor, was realized without a regulatory plan, with complete absence of cadastre and any kind of street plan, on huge properties of few owners that were divided in small plots, were sold in low income class and were arbitrarily constructed. The basic priority of that period was the coverage of the urgent housing needs while the city's planning seemed a luxury.

The economic and social improvement that followed, after the second world and the civil war, dictated by the worldwide standards, had gradually led in a quantitative and qualitative development of urban land uses. These land uses were continuously mixed without regulatory plans to restrict or allow their allocation, until the 80' decade, so under the exclusive influence of market forces, anything was allocated anywhere, anytime. The plans that were legislated in the late 80's didn't result the desired land uses allocation as they didn't provide a strict frame for which land uses would be allowed and where they would be allocated. The aim of the current paper is to investigate these land uses self regulation during the period where planning did not exist and later during the period where planning existed, but it provided to land uses the freedom to be allocated almost anywhere.

The procedure that has been followed is the use of records from three successive censuses of employment and population in 1978, 1991 and 2001 for the Athens basin the center of Greece. The study of the diachronic thematic and areal redistribution of land uses in this area shows that although it was realized without any regulatory restriction and complete absence of principles until 1989 and under the influence of an indefinite plan since 1989 it is characterized by a deterministic land uses auto-regulation based on its citizen's everyday life needs. These continuous changes are defined and guided by markets forces, employment, land values in the context of the Total Urban Functional Demand (TUFD). It is remarkable that the formed groupings explain the 64% of the observed diversity of the recorded cases.

This auto-regulation refers to

(a) The reveal of Land Uses groupings which present continuous ameliorations, regarding their Urban Functional Relevance (UFR). This UFR refers to land uses that must co-function in certain city's areas aiming to their own Optimum Function (LUOF) as well as the City's Total Function (CTF).

(b) The way these groupings are allocated in the urban tissue, realizing gradually functional improvements of their distribution, aim a) to the Traffic Minimization (TM) but also in b) the formation of Autonomously Functioning Urban Sectors (AFUS). This deterministically, without regulatory principles, re-allocation and mixture of land uses is not being realized with random mixtures. As it is proved by the functional structures that result from the analyses in the three censuses records, the functions groupings that are revealed are composed by functions that aim to and are guided by the optimum city's function. It is also realized that these groupings through time are composed by different functions, fact that can be considered as improvement of city's functional behaviour.

It is obvious that those two urban dimensions interact in a perpetual completion to the urban sustainability and resilience and secure the better respond to city's change.

## 2 INTRODUCTION

Each city defines its general function in its urban planning wider area. Land uses are the substance of urban planning that defines city's form and function. In urban planning in Greece, land uses planning since 1833, defined only the kind and position of public uses. It was 1979, when for the first time not specific functions but groups of functions were allowed to be allocated. The ambiguity of this kind of planning gave the city's functions the freedom to be allocated with their own criteria dictated by market forces.

The gigantism of Athens capital, which constantly attracted new citizens, with intensity that differed according to political, economic e.tc. conditions led to plans which tried to manage land uses in the urban tissue. In 1985 a regional plan that was legislated tried to relieve the centers' population congestion and lead

to multi-centric development. In time new urban plans for each of the Athenians basin municipalities were legislated in order to achieve the better management of land uses allocation. Unfortunately the legislated plans of “laissez faire” without a strict frame of allocation gave in first regard the chance to anything to be allocated anywhere, anytime without any areal and thematical discipline.

The current research will reveal the thematic areal and diachronic redistribution of land uses in Athenians basin, an area that by the way concentrated the majority of the country’s population and employment. Although the centre of Greece was developed without any regulatory restriction and complete absence of principles until 1985 and under the influence of indefinite plans since 1985. So, the final result of land uses allocation is characterized by their auto-regulation based on its citizen’s everyday life needs. We will focus on land uses groupings that have been realised through time, with or without restrictions, which result gradually to functional changes of their distribution

### **3 METHODOLOGY**

Our main aim is to examine the form and the composition of land uses groupings. We examine three dates 1978, 1991 and 2001 in order to obtain a more general and continuous in the time picture of them. The land uses groupings will be revealed with the use of Principal Components Analysis. This statistical technique reveals the structures of the variables that are inserted in the Analysis, which in our case are land uses, measured by their recorded employment. These Analyses reveal the functional structure of the Athenians basin expressed by the extracted Components. These Components are structured by the best linear relationship of the land uses. That is to say which land uses are areally related. Finally the Components are rotated in varimax rotation which allows the best thematic and areal correlation of land uses. In order to achieve the best comparability of the three extracted structures we force the Analysis to extract five components for every available assessment.

### **4 LAND USES GROUPINGS IN THE THREE DATES**

In 1978 the Athens basin was a pole of new residents attraction, with industrial zones developing in its around while the tertiary activities were developing in its central core. The employment that was recorded was 619.664 people. The majority of employees were concentrated in the tertiary sector (57%) while the industrial and manufacture activities gathered the 43% of the recorded employment. This time as told, in the Athens basin existed nor regional neither urban planning, in order to define the detailed allocation of the 37-different kinds of land uses. So, the main parameter that influenced land uses allocation was the coverage of the basin’s citizen’s everyday life needs that ensured the best activity’s function, hence it’s maximum profit.

The extracted functional structure, from the Principal Component Analysis, in 1978 is composed by five components (groupings of land uses) that explain the 24,5% of the total variance of the existing employment situation (Table 1). This percentage seems to be very low in order to explain adequately and

persuasively the existing shaped structures, but it must be pointed out that the Analysis is forced to reduce the number of Components in order to be comparable with the structures of 1991 and 2001. It must also be pointed out that the above results from an Analysis of 38.322 areal units in which we examine totally 1.417.914 observations (37X38.322).

The first group of land uses (composed by 12 of the 14 tertiary activities) defines Central daily needs land uses while the rest four groupings are formed exclusively by the remaining 23 industrial uses. It has revealed that although restrictions regarding land uses did not exist, the activities themselves seeking to take advantage of the profits that can be ensured by certain areas position have shaped cores where activities are concentrated. It has also revealed that industrial uses have shaped groups as they need areas with common characteristics that means low land prices and adjacency with main axes and in some cases they function on an assembly line.

In the period since 1978 until 1991, have intervended the legislation of the Regulatory basin’s plan and the Urban plans for each of the 56 basin’s municipalities. Those plans aim, was to create sustainable areas, develop sub-centers and isolate the industrial uses in certain areas while they encouraged the mixture of all uses in order to achieve multifunctional areas.

The employment that has been recorded in 1991 in the 51 activites have increased to 898.307 (from 619.664 in 1978), with 71% distributed in the tertiary sector while the employment in manufacture industries has

decreased from 266.455 to 258.305 employees. The extracted functional structure, in 1991 is composed by five components (groupings of land uses) that explain the 35% of the total variance of the existing employment situation (Table 2). The fact that although the absolute number of employment has increased and the total explained variance of the existing employment situation has also increased shows the tendency for a certain land uses regulation. Central activities remain the main grouping of land uses with increased variance. The second grouping is composed by Public central activities and the rest three groupings are composed by relevant and in some cases functionally connected activities.

THE LAND USES GROUPINGS IN 1978						
Component	Economic activity	Employees	Loading	Variance		
CENTRAL DAILY NEEDS LAND USES	Retail Trade	101.711	.638	6,673		
	Wholesale Trade	49.353	.625			
	Transactions of Affairs	15.921	.604			
	Brokers and representatives	5.454	.590			
	Insurances	6.695	.544			
	Clothing and footwear Industries	38.815	.440			
	Restaurants and Hotels	31.703	.423			
	Rest Industries	7.199	.408			
	Personal Services	12.390	.376			
	Banks and rest Economic Institutions	20.136	.363			
	Printing, Publications and relevant activities	12.952	.315			
	Services of Recreation and Culture	7.475	.108			
	Medical and Sanitary Services	27	.069			
	INDUSTRIAL USES	Industries of products from tyre and plastic material	10.311		.468	5,04
Textile Industries		31.359	.434			
Industries of not metal mining products		10.283	.407			
Industries of Furniture and goods of furnishing		14.425	.383			
Industries of Timber and Cork		8.642	.346			
Industry of Food except drinks		20.805	.267			
Chemical industries		13.239	.265			
Basic Metallurgic Industries		1.618	.241			
Wholesale trade of Litter and Clippings		516	.234			
Manufacture of machines and appliances		8.686	.210			
Manufacture of electric machines, appliances and remaining tyres		15.409	.103			
Tobacco industries		3.683	.039			
INDUSTRIAL USES		Industries of Oil and Mine products	659	.505	4,71	
		Mobile Renting	872	.333		
	Paper Industries	5.679	.182			
INDUSTRIAL USES	Transports	83.039	.600	4,4		
	Leather and furs Industries	3.669	-.273			
	Manufacture of Carrier means	32.871	.266			
	Storages	590	.154			
INDUSTRIAL USES	Drinks Industries	4.322	.719	4,00		
	Manufacture of metallic products	21.791	.680			
	Communications	14.922	.171			
	Services of Hygiene and Cemeteries	2.533	.078			

THE LAND USES GROUPINGS IN 1991				
Component	Economic activity	Employees	Loading	Variance
Private central activities	Health and social activities	43.560	.734	10,86
	Public administration and defence, social insurance	98.738	.708	
	Intermediary finance Organisation	22.597	.699	
	Retail trade	98.302	.631	
	Recreation, cultural and athletic activities	21.031	.612	
	Insurances	8.122	.558	
	Publications and printings	13.323	.515	
	Hotels and restaurants	36.239	.480	
	Other activities of services	14.857	.361	
	Information technology and relevant activities	2.398	.347	
	Air transports	10.107	.332	
	Chemical goods production	9.124	.313	
	Medical tools production	1.489	.174	
	Activities relevant with the activities of intermediary financing organisations	660	.136	
Public central activities	Research	14.705	.796	9,49
	Wholesale trade	54.695	.678	
	Organisations	7.637	.664	
	Water collection, cleaning and distribution	15.848	.625	
	Recycling	1.661	.550	
	Manufacture of paper pulp, paper and products from paper	6.705	.540	
	Post offices and telecommunications	17.095	.508	
	Textile Production	17.047	.438	
	Coke Production	4.073	.362	
	Equipment Renting	1.731	.345	
	Equipment Manufacture	1.236	.183	
	Constructions	57.656	.625	
	Clothing manufacture	26.364	.612	
	Land transports and transports via conductors	35.015	.603	
Furniture manufacture	15.769	.548		
Leather production	7.757	.519		
Manufacture of metallic products	11.184	.505		
Industry of foods and drinks	13.992	.501		
Production of engines	5.519	.389		
Vehicles retail sale, maintenance and repair of cars of motorcycles	31.010	.375		
Manufacture of tyre products	4.986	.360		
Timber Industry	3.796	.297		
Manufacture of other products than not metal mining	5.429	.271		
Electric engines production	2.344	.258		
Basic metals production	3.364	.255		
Urus production	3.405	.214		
Tobacco production	3.521	.259		
Computer production	961	.174		
Real estate	945	.200		
1 <sup>st</sup> grouping Industrial uses	Water transport	16.283	.718	8,09
	Equipment of transport production	13.255	.513	
2 <sup>nd</sup> grouping Industrial uses	Auxiliary and relevant to the transports activities, activities of travelling agencies	13.253	.469	3,73
Transports				2,64

THE LAND USES GROUPINGS IN 2001				
COMPONENT	ECONOMIC ACTIVITY	EMPLOYEES	LOADING	VARIANCE
Mixture of central and industrial uses	Constructions	94.135	.860	22,09
	Clothing manufacture	22.835	.840	
	Hotels and restaurants	67.740	.800	
	Retail trade	147.567	.799	
	Manufacture of metallic products	13.159	.720	
	Furniture manufacture	17.486	.707	
	Recreation, cultural and athletic activities	35.652	.695	
	Auxiliary and relevant to the transports activities	26.644	.670	
	Food manufacture	20.966	.654	
	Publications	24.419	.639	
	Land transport	41.950	.585	
	Administration and social services	120.173	.571	
	Other services	19.860	.568	
	Textile manufacture	7.656	.567	
	Trade	46.551	.540	
	Plastic equipment manufacture	3.126	.529	
	Timber manufacture	6.110	.498	
	Paper production	3.216	.477	
	Basic metals production	4.287	.459	
	Leather production	6.679	.411	
Organisations	3.890	.376		
Financial enterprises	35.652	.697	12,92	
Education	85.806	.677		
Health	75.940	.618		
Information technology and relevant activities	13.103	.561		
Post offices and telecommunications	21.398	.525		
Insurances	14.201	.511		
Travel agencies	8.423	.488		
Air transports	9.113	.418		
Chemical goods production	11.258	.411		
Equipment renting	1.437	.234		
Industrial uses	Recycling	1.017	.699	8,06
	Tobacco production	2.552	.623	
	Oil and fuel Production	3.932	.610	
	Vehicles trade	34.929	.508	
	Research	2.583	.463	
	Computer production	1.132	.409	
	Real estate	1.653	.341	
Advanced industries	Electric engines production	8.518	.508	3,76
	Medical tools production	2.532	.427	
	Production of engines	2.405	.316	
	Radio, tv and communication equipment production	1.630	.298	
	Cars production	1.001	.232	
Transports	Transport	21.335	.849	2,15
	Manufacture of transports equipment	9.317	.394	

Tables 1-3.

The decade from 1991 to 2001 was characterized by the constant review of the existing plans that faced difficulties in their application as they did not face the obvious demands of the city's function. The census of 2001 employment shows that it has increased in a 38% percentage (from 898.307 in 1991 to 1.245.542 in 2001). This increase is recorded in manufacture and industrial activities (22,4%) and in the tertiary sector (38%) The P.C. Analysis has revealed that, the five groupings that are extracted explain 49% of the total

variance of the existing employment situation (Table 3).. The first grouping presents a high mixture of central, industrial and manufacturing land uses as it contains 22 of the total 51 urban functions, explaining at the same time 22,09% of the total variance. The second grouping contains 9 central activities and only one manufacture activity. It is obvious that the land uses are creating groups in a bigger degree in relation with 1991 and also that land uses are still mixed without a strict functional criterion.

## 5 THE ALLOCATION OF THE LAND USES GROUPINGS

For the examination of the land uses groupings allocation, the revealed components are grouped in three categories: the central, the industrial and the mixed groupings. The distribution of the components of the three dates in each of the above three categories is shown in table 4.

<b>SHAPED GROUPINGS</b>			
<b>DATES</b>	<b>CENTRAL FUNCTIONS</b>	<b>INDUSTRIAL FUNCTIONS</b>	<b>MIXTURE OF CENTRAL AND INDUSTRIAL USES</b>
1978	Central daily needs land uses, (1st)	2nd , 3rd, 4th, 5th Industrial land uses	
1991	Private central uses(1st) , Public central uses (2nd)	3rd, 4th, 5th	
2001	Central land uses (2nd)	3rd, 4th, 5th	1st

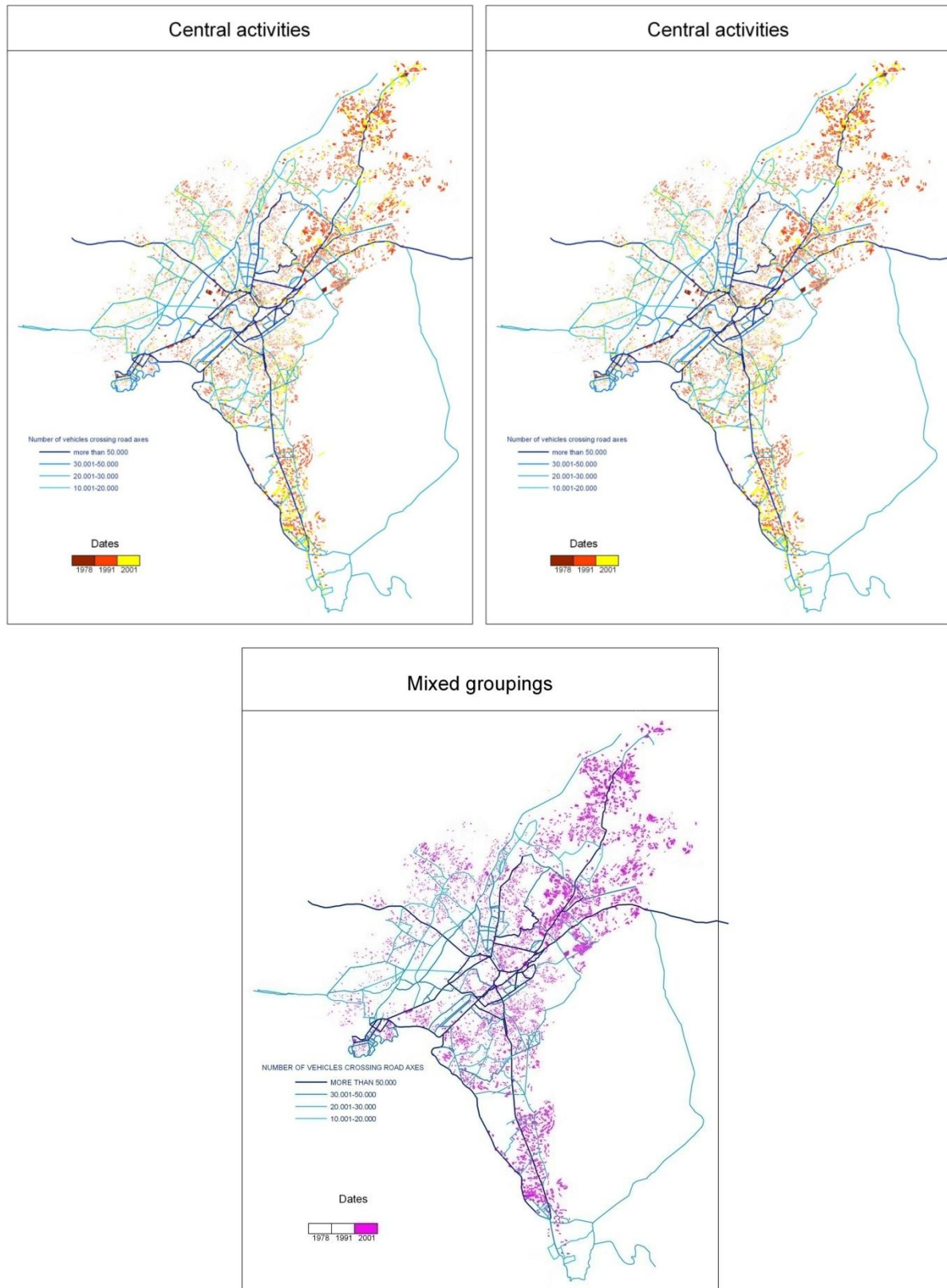
Table 4.

The areal investigation of land uses behavior shows that:

As for central functions, in 1978, the first grouping is allocated in the central core of the basin while other central functions cores and autonomously functioning sectors have not yet been created. In 1991, the central functions are allocated not only in the existing since 1978 core, but have extended on axial form on avenues that lead and cross high-income suburbs. In 2001, central activities are allocated with scattered form in the basin's total, more intensively in the south, north and east basin and will less intensity in the west. We conclude that the existing central functions cores are expanding with different intensity, towards all areas, so autonomously functioning central cores are created and that the basin is totally served (Map 1).

As for industrial and manufacture functions, the initial cores that were allocated in 1978 in the basin's total, were extended in 1991 in wider regions and more intensively in the west basin, that still remains the traditional industrial degraded area. In 2001, the mapping of the industrial and manufacture groupings show that they have remained steady in the same areas, as they have not extended or shrunk (Map 2). Therefore, although the employment in this sector has increased it is still concentrated in the same areas, co-existing with tertiary activities. It is concluded that the segregation of uses and the creation of functional zones with specific functions is not created while on the contrary everything is allocated everywhere but with some restrictions regarding not the existing plans, but the optimum service of the urban areas criterion that provides the best profit for these activities.

In 2001, the majority of the recorded cases shows that tertiary and manufacture activities are more intensively mixed. Therefore, the thematic mixture of land uses remains random in the majority of the recorded cases. In the north south and east basin in 2001 the new mixed uses groupings are scattered in all areas where intense central functions groups are also allocated. It seems that the activities of this grouping, that are mixed in a random way, are allocated with the criterion of the maximum coverage of the until then not satisfactory served areas. Therefore, new enterprises of all kinds avoid the congested center and prefer areas that had not until then developed functional centers but had increasing population. So, autonomous areas have started to develop, concentrating all kinds of functions. This auto-regulation that is not exactly following the legislated plans, that tend to sub-centers creation, show that traffic minimization has up to a point been achieved, while autonomously functioning sectors are created with a big degree of randomness. It is concluded that a thematic and areal balance has not yet been achieved. This phenomenon is related to the constant employment and population increase of many areas assisted by the freedom that is provided by the existing legislative framework.



Maps 1-3.

## 6 CONCLUSION

The subject of the current conference, as posed, leads to the search of the way of grouping of the land uses into the urban body. The structural investigation of an urban body formed during almost a quarter of a century without practically any interference shows clearly that the expected groupings are not steady but for different reasons they change adjusted to the total urban function. Again we are facing the Heiraclitus

famous saying "everything flows". We cannot compare directly the three structures because they result from three different matrices that contain different data from three dates that cover 23 years of the city's life. Our comparison will be nominally and conceptually only from the results of the revealed structures level.

The revealed parts of the city (groupings of land uses) in the three examined dates aim to the regard that the land uses are grouped according to their arising urban functional relevance and simultaneously according to their own optimum function in the total city's frame. Initially it is not possible to imagine a completely clear and rational layout of the thematic and areal defined "parts" of the city. This happens because the city's function is very complicated and also it is accumulatively developed. The revealed results of the analysis are constituting the creation of new theoretical dimensions, namely new parts of the city's function which present the best possible areal distributions. These "parts" are composed by phenomenically random groupings of the recorded urban functions. They result from a numerical classification, based on their linear relations and show that there is a phenomenically random allocation of the urban functions anywhere and anytime. The mapping of these "parts" shows on the contrary that they are areally mixed not randomly but according to a certain URBAN FUNCTIONAL AUTO-REGULATION.

## 7 REFERENCES

Hellenic Statistical Authority, Employment census, 1991,