INTRODUCTION TO STRUCTURAL LANDSCAPE ANALYSIS:
OVERVIEWS ON THE INDUSTRIAL LANDSCAPES OF GREATER ISTANBUL

A Ph.D Thesis

Presented by

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to

the Graduate School of Natural and Applied Sciences
of Middle East Technical University
in Partial Fulfillment for the Degree of

Ph.D

in

CITY PLANNING

MIDDLE EAST TECHNICAL UNIVERSITY

ANKARA

January, 1992

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ABSTRACT

INTRODUCTION TO STRUCTURAL LANDSCAPE ANALYSIS: OVERVIEWS ON THE INDUSTRIAL LANDSCAPES OF GREATER ISTANBUL

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Ph.D in City Planning

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January, 1992, 265 pages

This study introduces a new analytical procedure for landscape analysis. Area coded Capacity Reports files of the Union of Chambers of Commerce and Industry of Turkey are analysed from their mappings on incidence matrices. The procedure comprises four steps. First we concentrate on the representativity of generated incidence matrices. Having established their representativity, strenght of associative and dissociative relations among attribute pairs is measured through Gamma (Yule's Q) index. These indices are presented in matrix format and summarized as structural diagrams. Analyses carried on Greater Istanbul enabled us to detect the industrial geographic properties of two the different layers of the metropolitan production space generated by the spatial distribution of small and large scale plants.

Predictive capabilities of industrial geographic attributes are measured through Uncertainty Coefficients. Since patterns mapped on incidence matrices are scale dependent, sensitivity of best predictors is controlled using general and category specific slicing parameter vectors. The study convincingly illustrates that metropolitan production space of Greater Istanbul is made of two layers with inherently different properties in terms of associative and dissociative spatial relations among production factors, hence, it could be conceived of as being shaped by the superposition of two distinct industrial geographies.

Finally, implications for the analysis of, and for the description of changes in, urban land-use structures and other landscapes are discussed.

Keywords; Structural Analysis, Intra-Metropolitan Industrial Landscapes, Computer Aided Pattern Recognition

Science Code: 601.05.01

ÖZ

YAPISAL PEYZAJ ÇÖZÜMLEMELERİNE GİRİŞ:

İSTANBUL METROPOLİTEN ALANINDA SANAYİ PEYZAJI ÇÖZÜMLEMELERİ

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Doktora Tezi, Şehir Planlama Anabilim Dalı

Tez Yöneticisi: Prof. Dr. Ilhan TEKELI

Ocak, 1992, 265 sayfa

Bu tezde, yapısal peyzaj çözümleme problemine yeni bir yaklaşım ve yöntem önerisi getirilmektedir. önerilen yaklaşım, coğrafi verilerinin 0-1 matrisleri üzerindeki mapping' lerinin yarattığı örüntülerin çözümlenmesine dayanmakadır. Dört aşamalı bir yaklaşım önerilmektedir. Ilk aşamada 0-1 matrislerinin temsil edici olup olmadığı sınanmakta, temsil edici oldugu saptanan matrisler üzerinde Gamma (Yule's Q) endeksi yardımıyla değişkenler arasındaki çekici (associative) ve itici (repulsive) ilişkinin kuvveti ve yönü saptanmaktadır. Ikinci aşamada elde edilen Gamma matrislerinin kolay okunmasını ve yorumlanmasını sağlayan grafik bir gösterim önerilmektedir. Endüstriyel peyzajın çok boyutlu bir haritası şeklinde ele alınan 0-1 matrislerinde her özelligin birbirleri üzerindeki açıklama güçleri Asimetrik Belirsizlik Katsayılarıyla ölçülmektedir. üçüncü aşamada Asimetrik Belirsizlik Katsayılarıyla

kurulan matrisler kolon kolon değerlendirilmekte ve peyzajın anahtar değişkenleri ortaya çıkarılmaktadır.

Türkiye Odalar Birliğinden alınıp coğrafi olarak kodlanan Kapasite Raporları kullanılarak yapılan görgül çalışmada, Istanbul Metropoliten Alanında sanayi peyzajının küçük ve büyük sanayi kuruluşlarının oluşturduğu iki katmanı bulunduğu saptanmıştır. Bu katmanlar çözümlenerek her iki katmanın birbirinden çok farklı anahtar değişkenleri bulunduğu saptanmıştır. Bu bulgular, gözden geçirilen tüm metropol içi sanayi kuramlarının önermeleriyle uyum içerisindedir.

Sonuç bölümünde önerilen yaklaşımın kentsel arazi kullanım yapılarının incelenmesi ve bu yapılardaki değişmenin betimlenmesi konusundaki katkısına işaret edilmektedir.

Anahtar Kelimeler: Yapısal Çözümleme, Metropol Içi Sanayi Peyzajları, Bilgisayar Destekli Örüntü Tanıma (Pattern Recognition)

Bilim Dalı Sayısal Kodu: 601.05.01

ACKNOWLEDGEMENTS

Acknowledgments are kept rather short these days. But let this unconventional study be unconventional in this aspect too.

I would like to thank Professor Mübeccel Kıray for giving me this homework some twenty years ago when she said 'its up to the students of space to find out how social and economical phenomena are reflected in space'. (Notice that Professor Kıray does not specify the nature of space upon which social and economic phenomena are reflected !) I also acknowledge that Professors Peter Gould, Ronald Atkin, Jeffrey Johnson have been highly influential in this study. I also thank colleagues in the City Planning 301 studio with whom we have studied land-use maps and discussed changes in land-use patterns for years.

I would like to thank my family, Gülden and Şafak for all the life support systems they have provided throughout difficult *eighties*. I would like to thank Professor Tansı Şenyapılı for taking over my duties at school including proof readings. I would like to thank Ozcan Altaban for long discussions on the impact of changes in urban land-use patterns. As usual, I would like to thank Arzu-Nejat Sert for the drawings and my friend Hürol Tabak of the METU Computer Center for his assistance in my programming work. I also acknowledge that exploratory studies carried out in the Istanbul Labor Housing

Project sponsored jointly by the IDRC of Canada and Turkish Social Science Association were of great help in decoding industrial geographic information. Results derived from this research project constitute the external data base of this thesis. So, I would like to thank members of the project team and its director Professor Ilhan Tekeli with whom we discovered more than one feature of the industrial distributions in and around Greater Istanbul.

Last but not the least, I would like to thank Professor Ilhan Tekeli, once more as a supervisor, for his patience, confidence in me and for his encouragements. Without his un-ending support and suggestions this study would surely not see the light of the day.

These acknowledgements illustrate that this research process unfolded on a multidimensional structure especially rich in humane attributes. I sincerly thank all of you.

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CHAPTER I

INTRODUCTION

This study attemps to show that properties of landscapes in general and of intra-metropolitan industrial landscapes in particular can be studied from patterns they generate on incidence matrices. To this end a new analytical procedure is proposed and used to derive qualitative properties of various industrial landscapes of Greater Istanbul. This procedure enables students to produce replicable descriptions of multidimensional landscapes. We also show that this procedure can also be used for the detection of those attributes that account for the distribution patterns of others, hence, play key roles in the constitution of industrial landscapes at the intra-metropolitan level. It constitutes the first step of a larger research project devised to analyse urban structures in general and the production space of metropolitan areas using vertex specific variants of Q-Analysis. (1)

As it is time and again illustrated in many empirical studies, vertex specific variants of Q-Analysis are relatively new, and as such, they seem to constitute a new methodological perspective for the investigation of structures in general and of urban structures in particular. These new approaches are of interest simply because they enable students to investigate the unfolding of multi dimensional processes on a backcloth made of stars and hubs. (Johnson, 1983) Although the derivation of this multidimentional configuration of structures is a relatively straightforward programming exercice, correlation analyses are needed for the determination of strongly associated (correlated) attributes that can be taken up as critical hubs. Insights derived from the proposed procedure can be used to meet this requirement. In other words this procedure would be of some interest for those students willing to use vertex specific variants of q-analysis in landscape studies.

But, as we are yet at an introductory stage and are trying to meet the requirements for its empirical implementation we are not going to present an overview on the evolution of this relatively new language of investigation. This new approach is devised to avoid linear and partitional filters that are inevitably introduced between the observer and the object under scrutiny when investigation is carried out through conventional analytical tools such as regression, principle components and factor analyses or through partional procedures of numerical taxonomy. (2) We have provided some references to this new language which would facilitate the assessment of differences between this new approach and its more conventional counterparts. Let us state however that both Q-analysis and its vertex-specific variant Theory of Stars are based on a totally different kind of mathematics (algebraic topology) and that, as the difference stems from the representation (definition of the individual), are bound to remain distinct from conventional tools of investigation. (Harvey, 1969: 481-6)

Whether one uses conventional q-analysis or its vertex specific variant Theory of Stars, (Johnson, 1983) the analysis starts with the generation of an incidence matrix depicting relation between a set of individuals and their attributes. If these matrices are produced from area coded industrial attributes, the end product, represented as a bi-colored graph, becomes a highly representative model of the situation on the ground. (See Chapter Two) Correlation analyses carried out through adequate indices will enable us to extract many hints pertaining to the spatial organization of major factors of production, in other words to the dominant qualitative features of industrial landscapes. Of course, results derived from these analyses will, above all, depend upon;

a. the nature of attributes taken into account,
b. the definition of the individual,
c. the definition of the population shaped through the union of these individuals,
d. and finally, the scale of analysis (or the level of analytical abstraction).

This study is based on 12 industrial attributes produced in area coded Capacity Reports files of the Union of Chamber of Commerce and Industry of Turkey. (3) Neighborhoods are considered as geographical individuals. As we have taken up studies that relate to the entire metropolitan area as well as to its geographical components, the definition of population changes in each particular case. Incidence matrices are produced according to following three different levels of abstraction.

1. according to slicing parameters derived from the distribution of the total plant population assuming an even distribution of production factors amongst neighborhoods.

2. according to slicing parameters derived from the distribution of small plants, assuming an even distribution of production factors amongst neighborhoods.

3. according to slicing parameters derived from the distribution of large plants assuming an even distribution of production factors amongst neighborhoods. (See; Chapter 2 for the definition of small and large plants)

We have used a simple analytical procedure which consists of the following three steps;

a. the derivation of incidence matrices,

b. determination of the strenght of areal association amonst various factors of industrial production through gamma indices and their diagrammatic representation.

c. the search for key attributes, binary distribution of which partially accounts for the distribution of many other attributes. This part of the analysis is based upon the differentiation in the values of uncertainty coefficients.

It is our contention that this simple analytical procedure devised to prepare the ground for subsequent studies, generate side products that would be extremely useful if they are used as tools for the description of industrial landscapes and that the procedure can be generalized in other fields of landscape analysis where associative and repulsive spatial relations are important. One could think, for instance of its eventual implementations in electoral geography and in the investigation of changes in urban land-use systems.

But, it must be stated from the very outset that these landscape descriptions are bound to be remain as abstract configurations, especially if we do not know how to read and interpret them. To avoid this difficulty we need to use what Johnson calls external information or data to facilitate the task of interpretation. (Johnson, 1990) It is evident that in our case we need two different types of data.

We will first need theoretical and empirical studies relative to the spatial organization of industrial production factors at the intra-metropolitan level. In this regard, we will use insights derived from intra-metropolitan industrial location theory.. But, although it is unlikely for students to interpret these representations of industrial landscapes without any prior knowledge on the logic of intra-metropolitan plant location, the acquision of these insights *alone*, does not warrant a successful landscape analyses of the representations of these landscapes. Because, particularities stemming from the specific character of places may modify, these patterns. In other words we will also need place specific information. This property illustrating the difficulties of concrete landscape analyses has been emphasized by Scott (1988: 232-3) :

> ... Despite my emphasis on the abstracted logic of production, labor markets and communal development, social processes are in fact empathetically not abstracted from time; they are embedded in a complex temporal matrix made up of cycles of different amplitudes, episodic shifts from one conjecture to another, and the long flow of history.
>
> Second, at any given moment social processes have a tendency to work out themselves out in sometimes surprisingly different ways from place to place as they come into contact with diverse preexisting conditions. All of this temporal and geographical variability helps to account for the enormous variety of forms of economic organization and urban experience that occur in reality. Consider, as examples of this proposition, such contrasting modes of industrial development as represented by craft communities, the classical factory system, mass production, or modern high-technology industry; this variety is further compounded when we take into account the (approximate) respective urban analogues of these phenomena in the form of Birmingham at the beginning of industrial revolution, Manchester in the mid-nineteenth century, Detroit in the interwar period, or the great megalopolis of Southern California today. .... These patterns have been variously inscribed on the landscape of capitalism from its very historical beginnings, though, as pointed out, they take on different specific forms in different times and in differnt places. The landscape is continually being structured and restructured as localized territorial complexes of human labor and social life are created, transformed and then dissolved again in conformity with what Schumpeter called the creative destruction of capitalism. The modern metropolis is central to these processes, both as their basic point of reference and as their most intense concrete expression.

Fortunately it was possible for us to avoid part of the above cited difficulties since we had at our disposal an historical overview on the last 150 years of the evolution of the metropolitan area by Tekeli, and an exploratory study on the general industrial geography of Greater Istanbul by this author which sheds light mostly on the quantitative aspects of industrial distributions in the same area. (4)

We start with a problem oriented selective overview on theoretical studies relative to intra-metropolitan plant location. This will be a selective discussion as we are not trying to present a comprehensive overview on theoretical contributions to the problem of intra-metropolitan plant location but trying to extract hints that would facilitate the decoding of representations of industrial landscapes, considering the fact that our geographical data base, comprises no more than twelve attributes. (see chapter two for a complete list). This selective overview will then be followed by a brief summary of major conclusions derived from our recent exploratory quantitative industrial geographic study based on the same data set (Güvenç; 1992).

1.1 Theoretical Perspectives on Intra-Metropolitan Industrial Location

Although production activities has almost invariably been integral parts of urban structures, theoretical studies on the production space of metropolitan areas were not high on the agenda for at least fifty years, though with noticeable exceptions Scott rightfully cites (Scott, 1988) Weber, Allen, Wise, Hoover and Vernon, Hall, Sjoberg. We must also include contributions stemming from Lowry. (Scott, 1982) The relatively low emphasis ascribed to the analysis of intra-metropolitan production space in mainstream urban theory has theoretical and ideological motives behind and perhaps the latter, are not independent from each other. The following passage from Castells (Castells, 1975: 7) puts forward this selective attitude of conventional urban theory.

> One of the major paradoxes of the current urban problematic is the meager attention that is paid to prouction space and in particular to industrial space. The city is largely approached from the vantage point of residential activity, social and cultural exchange, and the organization and distribution of services. When its productive functions are treated reference is made above all to the 'production of information' while taking industrial elements as a fixed datum, an outdated reminiscence of a past that is being surmounted by technical progress. This is because urban ideology ties within the family of ideologies of the 'consumer society'.

There is nonetheless a vast body of literature from which one could derive penetrating insights on properties of metropolitan industrial production spaces. However, if we adopt a more stringent definition of theory and reserve it to only those conceptualizations which simultaneously satisfy the following four conditions put forward by Dear and Scott , (Dear and Scott, 1981) most of these perspectives would appear as 'eclectic and partial' or 'rootless and capricious' as they put it.

According to Dear and Scott, social events are embedded within society and derive their logic and historical meaning from the general pattern of society as a whole. Urbanization and planning can never be effectively treated as object of theoretical study divorced from some wider theory of society. (Dear and Scott, 1981: 3-16)

However, linkages between the theory of society and the theory of urbanization are to be discovered, since they play key mediating roles in the generation of the 'general pattern'.

> These assertions, of course, provide no clues as to the nature of this general pattern. Nor do they (as yet) yield any insights into the ways in which this pattern is mediated and re-ordered by the specific processes of urbanization and planning. (Dear and Scott, 1981: 4)

After these cautionary notes, Dear Scott present the key components of the required theoretical framework for the study of urban phenomena. And these are;

1. The theory should define society as a total and evolving structure,
2. It should concentrate on and illustrate mechanisms wherby society is physically reproduced, ie. it must identify the material foundations of society in terms of a web of forces and relations of production.
3. It must be capable of demonstrating how the life-projects, intentionality and character of human beings in society are engendered and maintained.
4. It must be policy-relevant in that it is self-conscious about matters of social and political change. (Dear and Scott, 1981: 4-5)

Furthermore Dear and Scott suggest that if we fail to develop such a programme, social enquiry must surely fall into eclecticism, disjointedness and and arbitrary empiricism. (Dear and Scott, 1981: 5) We are going to see that post-structuralist programme set aside, none of the theoretical accounts relative to the intra-metropolitan distribution of industries is capable to satisfy simultaneously these four conditions and this, for understandable reasons, as the four criteria are not taken up with the same emphasis in research programmes under which these theoretical accounts are prepared. There are of course studies that are extremely useful for our understanding of properties of the intra-metropolitan production spaces such as (Allen, 1929) and (Wise, 1949) which can not be neatly classified in none of categories enumerated below, but shed light on many important aspects of the intra-metropolitan industrial landscapes. It may however not be wrong to classify theoretical accounts under following three groups.

a. Theoretical approaches to the problem of intra-metropolitan industrial location under Human Ecology as a covering research programme

b. Theoretical approaches to the problem of intra-metropolitan industrial location under a Behaviouralistic perspective.

c. Theoretical approaches to the problem of intra-metropolitan industrial location elaborated under Structuralist (Marxist) and post-stucturalist perspectives.

The first two programmes fail to meet the conditions put forward by the proponents of the post-structuralist approach. This, in a sense, is not unexpected as they are inspired by inherently different theories of science and preoccupations. But as far as our specific purposes are concerned, there are common elements at least in the description of patterns . Differences and discrepancies stem mostly from the conceptualization of generating mechanisms, social theories implicitly or explicitly adopted, and from differences in the mode of explanation of changes in these patterns. The ongoing debate between structuralist and behaviouralist students relative to the explanation of shifts in manufacturing establishments Sayer (1982), Keeble (1982) or on the social and economical impact of policies relative to polarization reversal in peripheral metropolises, Storper (1984), Townroe and Hammer (1984), Storper (1985) can be taken up as illustrative examples. These debates are particularly informative and show how differences relative to the world views of different schools of thought manifest themselves in the field of industrial geography, and how different meanings of the extremely loaded concept of explanation affect the interpretation of observed phenomena. However, we are not going to concentrate on them, as the aims of this particular study are limited to the description of major properties of intra-metropolitan industrial landscapes. In the following discussion we will try to identify first, the position of different approaches in terms of the four evaluation criteria stated above and then present their contributions to our understanding of intra-metropolitan industrial landscapes.

1.2. Contributions from the Chicago School of Urban Sociology

In spite of the sharp criticisms formulated against it, the morphological models of Burgess and its variants had a considerable academic success impact in the field of urban planning. Notice also that, this approach, [whether one likes it or not] comes close to meet above cited criteria. First of all, it considers urban patterns as being generated through the interplay of social analogues of biological processes of invasion, competition, dominance and succession. The city becomes a theater of operations for the social analogues of which are observed in the field of plant ecology. It provides us with an idealized morphological model of metropolitan areas (consider for instance the concentric zone model of Burgess (1925)) and explains the outward expansion of metropolitan areas as a result of waves emanating from the CBD (loop). Hence the expansion of the CBD, considered as a spatial manifestation of the development of control functions of the city, becomes one of the key elements for understanding changes in metropolitan land-use patterns. Harris (Harris, 1985) sees in this conceptualisation an implicit reference to Von Thünen's areal specialization model.

The only condition it fails to meet relates to the fact that, it fails to refer to an explicitly stated social theory, but adopts a social darwinist position with respect to the society as a whole. However Burgess makes an explict reference to what he calls 'machine industry' as being the prime generators of the metropolitan areas. (Burgess, 1925)

But the use of an ecological model has a number of important consequences for it becomes at the end an approach, which through the mediation of built-in adaptive mechanisms facilitates the resolution of urban conflicts, or spatial disequilibria. According to Park (1936) human ecology is;

> ... fundamentally, an attempt to investigate the processes by which the biotic balance and social equilibrium (1) maintained once they are achieved and (2) the processes by which when the biotic balance and the social equilibrium are disturbed, the transition is made from one relatively stable order to another.

It is evident that it is inadequate, if not totally irrelevant, to label this approach as being rootless or simplistic. And it is not by accident that Burgess's morphological model and its variants (sector and multiple nuclei theories) are crowned with great successes. Notice also that Burgess was up to late sixties one of the most cited authors in the field of urban sociology. The success of these models in the field of planning can be taken as an indication of the kind of urban model that is considered relevant by those who -through their professional expertise are in a position to- intervene in metropolitan structures. In other words, we have to re-consider inherent properties of these urban models, which, in spite of criticisms continued to be the focus of attention and a source of inspiration in many adjacent fields (such as new urban economics) and for urban planners.

First and above all, Burgess's concentric zone model is a theoretical scheme about the predominant social and economic characteristics of places. As such it attempts to bridge the gap between the spatial and the social-economic processes. Moreover, as opposed to the idiographic descriptive methodology which remained hegemonic in the anglo saxon urban geography up to early sixties it is a strategic break with empiricism and exceptionnalism. It is very important for instance that the characteristics of different zones are discussed in relation with each other. It is presumably this implicit emphasis on inter-actions between geographical individuals and their attributes that makes the model so attractive in practice.

Secondly, the invasion succession mechanism borrowed from the field of plant ecology, provides the model with a dynamical component and shows the ways in which such an urban form would evolve through time as a response to exogenous impetuses. As this mechanism starts with the expansion of the loop (CBD) and is propagated though waves that disturb previously reached equilibria, mechanisms of invasion and succession start to unfold until when a steady state is reached again. Notice also that the success and the generality of the model depends upon its highly flexible structure warranting a rather high applicability.

According to this morphological model the zone that comes immediately after the loop is an area of transition which in Burgess's words is being invaded by bussiness and light manufacture. followed by a third ring inhabitated by the workers in industries who have escaped from the area of detoriation (II) but who desire to live within easy access of their work. (Burgess,1925) To the best of our knowledge, this is the only passage in which a reference is made to a metropolitan a zone specialized in light manufacture which also suggests an implicit reference to a zone specialized in heavy manufacture which however is not visible on the morphological model. In other words this model introduces a distinction between light and heavy manufacturing, which is explicity stated in Homer Hoyt's axial growth or sector representation and in Harris and Ullmans multiple nuclei model. In the latter, metropolitan industry is located in districts specialized light and heavy manufacturing. Although they fail to yield an unambiguous definition of light and heavy manufacturing, we are inclined to consider these models as being extremely important for our purposes, since, they suggest a clear cut distinction between the two types of production process. We are going to see that if students are equipped with powerful discriminatory variable(s) it is possible to identify these two types of plants as generating two distinct industrial geographies.Notice also that Harris and Ullman's later metropolitan model which according to Harris perpetuating and refining central place theory, cite a number of factors that are instrumental in the formation of the intra-metropolitan industrial geography. Harris (1985) according to which manufacturing are concentrate in discrete integral districts. They identify four major factors that account for the emergence of this pattern.

a. Certain activities require specialized facilities
b. certain like activities agglomerate because they profit from cohesion
c. certain unlike industries are incompatible
d. and certain industries are unable to afford the high rents of the most desirable sites. (Pred, 1964))

Dominant features of the sector specialized in light manufacturing has been analized later in Hoover and Vernon's 'Anatomy of a Metropolis' which adopts the concentric zone model but instead of ecological analogues, and consider explicitly stated economic factors such as (externalities, inter plant linkages, proximity to supliers and customers, differences in wage rates, taxe differentials, land-use controls) as being influential in the generation of metropolitan land-use patterns. (Hoover and Vernon, 1959) Although it is not stated in the very same theoretical terms their account is not in sharp contrast with the latest accounts on metropolitan morphology. They detect for instance the tendency for small plants to concentrate in and around cheap labor pools, and the fragmentation of work tasks. Results derived from this study has later on generalized. Notice also that this study has been a continuous source of inspiration for a series of empirical studies on intra-metropolitan plant location, and on the incubator roles of zones in and around the city center. (Struyk and James, 1975), (Kurre, 1986). On the other hand, explicit references are made to factors affecting the intra-metropolitan distribution of capital intensive large plants dispersed at the out-skirts of metropolitan areas. (Hoover and Vernon, 1959)

In other words, these morphological models and studies on the anatomy of metropolitan areas are extremely important for the specific purposes of this study. For, they suggest that one can trancend sectoral differences and study intra-metropolitan industrial location under two basic categories ie. light (small) manufacturing and heavy (large scale) manufacturing. Hence provided that one is capable to discriminate between these two categories of plants, difficulties stemming from sectoral variation, differences in the physical properties end products, differences in transport and marketing requirements can be avoided. It would be interesting to lay stress on the fact that the relation between the size or the bulkiness of the end product and plant location is not as strong as it appears at the first approximation. Pred points out to the fact that Philadelphia's first locomotive was built in 1828 in the very heart of the central bussiness district. (Pred, 1964: 167) We are thus inclined to 'read' these ecological studies as pointing out to the possibility of macro-level intra-metropolitan industrial landscape analyses. Our exploratory studies convincingly illustrate that this bi-partite division of the total plant population is feasible. (Güvenç, 1989), Güvenç, 1992) The following critique by Pred (1964) can be considered as being too hasty.

> The Harris Ullman theory implies and the Burgess and Hoyt hypotheses suggest that all industries are either "light" or "heavy" and that the two types are spatially seggregated.

1.3 Behaviouralist Research Programme on Industrial Location

It would not be wrong to assert that a major part of empirical studies on industrial location in general and on intra-metropolitan plant location are carried out under the framework of behaviouralist programme. In spite of the sharp contrast that exists between proponents of behaviouralist and structuralist and post-structuralist approaches, it must be acknowledged that this approach facilitates empirical studies and that it is rather difficult to carry out empirical studies under structuralist or post-structuralist programmes. The contrast that exists between these two schools stems mostly from different meanings ascribed to the term explanation. Debates in the literature on intra-metropolitan industrial geography, convincingly illustrates that behaviouralist and structuralist students differ most in the explanation of locational change.

As far as this particular study is concerned, Townroe (1968) can be taken up as an illustrative example of this particular approach. First of all, behaviouralist programme distinguishes itself from neo-classical approaches by its insistence on the identification of the real motives of locational decision. And these motives are to be discovered through empirical studies at the establishment level. It fails to meet the first criterion stated above in that, it does not have an explicit reference to a theory of society. Though the social context in which locational decisions are taken up is not ignored, it is taken up as an external condition or environment. Society is then taken up as an external factor affecting decision making process. The firm, the is subject to internal and external pressures. Decision makers (managers) are then taking decisions affecting the life-cycle of the establishment and decisions relative to eventual plant locations are conceived to be an integral part of this decision making process subject to internal and external pressures, incentives, constraints etc. The relevance and the validity of this process will therefore be directly dependent upon the information processing capabilities of managerial bodies. Behaviouralist programme provides us with comprehensive charts or models depicting how external and internal factors affecting the decision making process (including locational decisions) are interconnected and a verbal account describing how the interaction may take place at the plant level. Needless to say that the flow diagrams and descriptive accounts are comprehensive enough *not* to exclude any factor that may possibly have an effect on decisions arrived at. But, because of the multidimensional and subjective nature of this decision making process, none of the factors has an a priori advantage in affecting decision making process more than others. In other words, relationships between operatives and management (shop floor politics) is considered to have, no a priori weight over say lack of production or storage space and the weights assumed by these factors will vary according to circumstances under which decisions are arrived at. Although it is not necessary to review all factors each time a decision is taken, none of them has the priviledge to dominate over others. This point is clearly indicated in the following statement by Townroe (1968 :

> The final decision chosen will *not* be the result of a detailed consideration for each of the factors mentioned above. One factor may predominate over all others such as the need for skilled men, or the availability of a factory to move out immediately, if the orders requiring the increase in output are urgent.

Although the programme do not have a component for pattern description, it is evident that it conceives of the constitution of industrial landscapes either at the intra-metropolitan or regioal level as being generated by thousands of independent atomistic decisions made by plant managers. It is of course not our purpose to provide a detailed critique of the approach. But one can say that as such, the Behavioralist programme contributes more to our understanding of decision making processes within industrial establishments than to the constitution of intrametropolitan industrial landscapes. For a detailed critique see Carr (1983).

What is important for our purposes is that even in this programme in which no factor or mechanism has the advantage to dominate over others, there exists a clear distinction between small and large scale establishments. In fact, Townroe recognizes that the same internal or external (or both) impetuses are likely to generate effects that are differentiated according to the scale of the establishment. He considers three different plant scales (or decision making environments)

(a) private capitalist, (small plants)

(b) corporate capitalist (large scale establishments)

(c) the state as an investor.

This of course is extremely important and encouraging for our industrial landscape analysis.

1.4 Structuralist (Marxist) and Post-Structuralist Approaches on Industrial Location

The introduction of structuralist and/or marxist analytical tools in human geography is a relatively recent phenomenon. It started in late sixties with a dissatisfaction and disillusionment with positivistic revolution Gould (1979) King (1979), and Harvey

(1973) can be considered as a first attempt to use this particularly subtle conceptualization in the field of geographical analysis. But as it is asserted by Scott (1988: 3-4) though stemming from diametrically opposed theoretical perspectives, the city continued to be conceptualized as a social reproduction space and the emphasis was on the issues of social justice and equity in the redistribution of real income. Harvey (1973) Needless to say that the world view adopted this this approach is incommensurable with its predecessors as it is based on a totally different social theory: historical materialism.

But, as it is succintly put forward by Massey (1981) in an introductory methodological statement on empirical analysis of industrial restructuring, unless channels of articulation are made explicit, this approach can hardly contribute to our understanding of processes at sectoral level.

> ... if neo-classical theory has difficulty in moving from the individual firm to the structure, Marxist work, though correctly starting from the level of the structure as a whole, and from the overall process of accumulation, sometimes appears to neglect examination of the form taken by those structural movements at a more disaggregated level.... The research has attempted firstly to look at the very different ways in which the crisis may be articulated in different sectors of the economy, and secondly to analyse, in relation to this, the response of individual capitals. This process of moving beyond the level of industrial capital as a whole is essential to any political understanding of the present situation.

Although Massey and Meegan (1978) and Massey and Meegan (1982) constitute noticeable contributions to the solution of this problem of articulation. This approach has after 80's evolved under the impact of the theory of structuration of Giddens and has been reformulated. It attempts to solve this problem of articulation through concepts such as agency, mediation. On the other hand specificities stemming from historical, and social factors and local characteristics are taken up as factors that can not be ignored.

It provides a theoretical framework in which, society is reconstituted both in time and space and therefore there is a room for the expression of contingencies and specificities. Not unexpectedly, the emergence of this programme has had a noticeable impact in many fields of inquiry, as it opens up new channels for the re-unification of social sciences. The impact of this programme in the field of human geography is presented in the following long quotation:

> ..... human geography seems to be poised on the threshold of a new kind of conceptual synthesis whose objective is to grasp the dynamics of the creation, reproduction, and transformation of territorial complexes of human labor and social activity in capitalism. These central question of human geography are capable of illuminating issues of major significance in the modern world and this in itself implies that we have little but option but to take these questions very seriously indeed. The dynamics of territorial complexes are part of a new economic order whose geographical extent is now nothing less than the world itself. Territorial production complexes form the material bases of the relative positions of nations within the world economy and so they are integral to the evolution of world political relations. they are also the framework with specific urbanization and regional development processes unfold.... More importantly perhaps, this suggested framework for undertanding territorial complexes raises the possibility of new theoretical syntheses in all the social sciences. We have suggested that territoriality is important not only to urban and regional development as such, but also to the unfolding of the forces of production and the evolution of class relations and thus to the macro-economic trajectories of capitalist economies.... The largely spaceless social theories that currently dominate our intellectual culture stand in urgent need of

retotalization via the dimensionality of geographical space and the particularities of place.

> In the light of these comments we want to advance the proposition that the geographical anatomy of modern capitalism can no longer be considered simply as the rather esoteric project of a coterie of professional geographers. We are inclined to go so far as to claim that the question of the geographical anatomy of industrial capitalism is likely to become rapidly of major theoretical significance throughout the social sciences at large. Scott and Storper (1986: 310)

One can derive many results from the above statement. First, studies on territorial production complexes are considered as being one of the major components of the proposed research programme on *geographical anatomy* of industrial capitalism. But, at the same time both authors clearly recognize that the completion of this programme do not depend on the contributions of geographers *alone* but on redefinition of the entire body of social sciences. Secondly, as major metropolitan areas are constantly structured and restructured, one could not expect to come up with a *final* statement on the properties of its production structure hence it should be an ongoing project. Thirdly although it is impossible to derive final statements, this phenomana should be under constant scrutiny of a restructured social science, simply because latter complexes are generators of political and economic change which determine relative positions of nations within a world economy.

A comparison of roles ascribed to the analysis of metropolitan production structures in this new research programme with the relatively marginal role latter studies assumed in the previous ones, suggests of course, a dramatic shift of emphasis in urban theory. Not unexpectedly, with the adoption of this approach, intra-metropolitan industrial location theory showed a rapid development. This new urban theory is formulated in such a way that it meets the four requirements previously set at the very begining. It makes direct references to a social theory which emerges as a variant of structuralist position, to mechanisms taken up as pattern generators, to those factors that warrant a relative stability (regulators) of complexes formed by plants with vertically disaggregated production structures. On the other hand it explictly states a series of mechanisms that lead to changes in these patterns. Hence, the problem of intra-metropolitan plant location is studied as an integral part of the growth, reproduction and dissolution of territorial complexes of economic activity. These processes are summarized as follows:

> Let us imagine that a nascent new sector has begun to make its appearance in the context of an expansion of the division of labor in society. Initially, it may well be that producers in this sector take up locations in a widely varying range of places. As aggregate production grows, however, certain places start to develop a competitive edge over the others. Part of this process of the economic differentiation of places consists in the development of "agglomeration economies" in certain favored areas as the dynamics of vertical disintegration, interplant linkage, subcontracting, and so on begin to work themselves out. In this way, such areas become increasingly specialized foci of production for the growing new sector and its various sattelite industries.... As these foci of development grow, they steadily acquire a surrounding pool of labor which, in turn progressively internalizes skills and other occupational attributes forged within the production system itself. These skills and attributes are created in ever more elaborate ways as the whole complex of social and economic activity takes deeper and deeper root, and as it manifests itself in increasingly more complex urbanization phenomena. With rising leves of economic development, internal socal pressures and land use predicaments are typically set in motion. Urban and regional planning agencies of various sorts are then called into existence as a way of dealing with these problems, and this buttresses the mechanisms of reproduction of the territorial system.

> These processes of territorial reproduction are in essence geared to the needs and development trajectory of capital. However just as capital helps to engender the conditions under which its own further progress and profitability are ensured, so it also seeks to free itself from the very dependence that it has created and that now keeps it locked in a structure of costs that tends to escalate ever upwards, (in matters of wages, land prices, local taxes and so on). In particular the very labor force that is broughth fort by capital learns gradually how to confront and deal with its politics of work, and capital seeks its own emancipation from this predicament. Thus in a wide assortment of ways, capital now attempt to undercut the contraints that tie it to a particular set of geographical conditions and that now constitute a bottleneck on further increases in profitability. The means of breaking this dependence consist pre-eminently of organizational and technological transformations of production processes, as manifested, for example in phenomena of capital deepening, restructuring, re-synthesis of work tasks, job deskilling and the like. As these processes run their course, densely developed complexes of social and economic activity (that in the first instance were called into existence by the rationality of capitalist production itself) begin to be internally destabilized and to disolve away. A major sign of this turn of events is the reconstitution of production in large, capital-intensive and vertically integrated plants which accordingly begin to scatter outwards across the economic landscape. This contributes significantly to the job loss/plant closure syndrome that seems to be endemic in many large metropolitan areas. The syndrome then begins to spread its blight over the local community, and unless the whole cycle of of the division of labor, inter-linkage and agglomeration can be regenerated in new rounds of growth, what began as a thriving center of production now faces the real possibility of being transformed into an enclave of fiscal and social demise. Scott (1983: 246-7)

Notice that here we do not only have a theory of intra-metropolitan industrial location, but an introduction to a new urban theory, constructed around the theme of spatial organization of commodity production. Of course the relevance and applicability of this theoretical perspective will, depend on local historical and social conditions. We know for instance as far as the case of Greater Istanbul is concerned we do not as of now, signs relative to the third phase of the process ie. de-industrialization while the same are visible on many old industrial regions elsewhere.

We would be the first one to acknowledge the selective nature of this extremely short analysis of theoretical contributions to the problem. But, as we are not going to deal with urban theory, but industrial landscape analyses this review is considered sufficient as it provides us with more than one important hint on dominant characterstics of industrial landscapes at the intra-metropolitan level. First of all, we see that in each one of the theoretical accounts taken up, an implicit or explicit reference is made to a differentiation according to the *scale* of plants.

In fact, the model of Burgess identifies a zone specialized in light manufacturing surrounded by a zone comprising what he calls "working mens homes", secondly, Townroe categorizes plants into three different categories. Private capitalist - Corpotate Capitalist and State industries and admits that this differentiation will have an impact on locational decisions. Finally, Scott identifies two different plant categories, (vertically disintegrated / vertically integrated capital-intensive plants) and shows that the two will exhibit different distribution patterns or industrial geographies. Hence, in spite of all their irreconciliable differences, these authors seem to aggree that the scale of plants have an important role to play in explaining their locational behaviour.

Moreover, these perspectives seem to aggree that it is possible to transcend sectoral variations and that as far as the analysis of their intra-metropolitan distribution is concerned, total plant population can be categorized into two groups with different properties ie. light/heavy, private capitalist (small) / corporate capitalist (large), vertically disintegrated/ vertically integrated.

Thus, since the early days of the Chicago school up to recent contributors seem to point out to the dual character of intra-metropolitan industrial landscapes. We are inclined to take up this dichotomy rather seriously as pointing out to a differentiation relative to the properties of generated industrial landscapes.

In fact, our exploratory study on the production spaces of Greater Istanbul convincingly shows that it is in fact, possible to transcend sectoral differences and to categorize total plant population into these two groups as small and large scale establishments. Güvenç (1992) Secondly, these two groups depict inherently different production factor deployment patterns. On the other hand the same study shows that spatial Lorenz curves drawn for various production factors in small plants category, are significantly more concentrated as compared to their counterparts in large plants category. This property is interesting for it resists geographical variation. Finally, the same quantitative study indicates that one can hardly interpret Lorenz curves derived for the total plant population as they exhibit fluctuations that cannot be accounted for easily. It follows that, one should not expect to extract useful hints from an *overall* industrial geographic study at the intra-metropolitan level and that the two components of the metropolitan plant population should be studied separately.

But, these results relate to the quantitative aspects of the distribution of production factors and they do not shed light on the qualitative aspects of these landscapes. In other words, our quantitative study do not show whether the spatial distribution of small plants generates an industrial landscape that is significantly different than the one generated by large scale establishments or not ? Neither does it show to what extent those sides of the metropolitan area specialized in small scale manufacturing differ from their counterparts specialized in large scale manufacturing

Using incidence matrices as multidimensional representations of industrial landscapes generated by the distribution of small and large scale plant and some simple conventional tools such as gamma (Yule's Q) or Uncertainty Coefficients as tools depicting predictive capabilities of different attributes we will, in this particular study, attempt to shed light on these issues. In so doing, we will probably be able to unpack the extremely loaded adjective dense used by Scott in his account of vertically disintegrated production complexes.

But, as the entire exercice is based on incidence matrices depicting the relation between places and their industrial geographic attributes, we start with an overview on their representativity. The analysis for total plant population shows that geographic incidence matrices it generates are highly representative as they account for no less than 90 % of total metropolitan labor force (some 255.000 according to capacity reports) and 95 % of the total industrial capital. (See Chapter II).

Having established the representativity of incidence matrices, in the third chapter, we present introductory analyses on the properties of diffeent representations of industrial landscapes within Greater Istanbul.

As it was the case in our previous study, (Güvenç, 1992) we have opted for a top-down approach. We start with analyses on general industrial geography. We take up, then separate analyses for its geographical components. These analyses indicate that industrial landscapes on each side of the metropolitan area are qualitatively different. Next, we concentrate on industrial landscapes generated by the intra-metropolitan distribution of small and large plants. This exercice shows that the general industrial geography is shaped by the superposition of layers with different features, hence neither geographic disaggregation nor scale discrimation alone yield reliable insights and that these landscapes should be studied on a geographically and economically disaggregated basis. Finally the analysis on the sensitivity of indices shows that they are extremely sensitive to changes in the scale of analysis.

Guided by these methodological hints we have studied industrial geographic properties of layers generated by the distribution of small and large scale plants in each one of the three sides of the metropolitan area at two different scales. The analysis shows that industrial landscapes generated by small and large scale plants are qualitatively different and that this qualitative distinction resists to a large extent geographical variation. There are of course, geographical differences in the properties of say large scale industrial landscapes, however using insights obtained from previous studies we show that these dissimilarities can be accounted for, if one knows local conditions.

In brief, this study shows that small and large scale industrial production generate landscapes that are qualitatively different from each other, that the proposed analytical procedure is capable to detect this differentiation and that it can be a useful tool not only in monitoring spatial impacts of industrial restructuring but also in structural analysis of land-use structures in general.

NOTES

(1) There are many introductions to Q-Analysis. The original statement is in;

Atkin, R., 1974 *Mathematical Structure in Human Affairs*, Crane Russak and Co., Inc., New York.

Non-technical introductions are in:

Atkin, R., 1981 *Multidimensional Man* Penguin Books, Harmondsworth, Middx.

Atkin, R., 1978 "A Hard Language for Soft Sciences", *Futures* Vol. 10, pp. 492-99.

Gould, P., 1980 "Q-Analysis, or a Language of Structure: An Introduction for Social Scientists, Geographers and Planners", *International Journal of Man-Machine Studies* Vol 13 (1980) pp. 169-99.

Gould, P., 1981 "Reflective Distanciation through a Metamethodological Perspective" *Environment and Planning B*, Vol. 10 pp. 381-92.

Gould, P., 1981 "Letting the Data Speak for Themselves *Annals of the Association of American Geographers*, Vol. 71, No. 2 pp. 166-76.

Gould, P., 1981 "Electrical Power Failure: Reflections on Compatible Descriptions of Human and Physical Systems", *Environment and Planning B*, Vol. 8, pp. 405-17.

Beaumont, J.R.
and Gatrell
A. C., 1981 *An Introduction to Q-Analysis, Concepts and Techniques in Modern Geography Series CATMOG 34* Geo Abstracts Ltd. Norwich.

For a discussion of the epistemological position of this approach see:

Gould, P., 1979 "Signals in the Noise" in *Philosophy in Geography*, eds. S. Gale and G. Olsson, Reidel, Dordrecht.

Melville, B., 1976 "Notes on the Civil Applications of Mathematics", *International Journal of Man-Machine Studies*, Vol. 8, pp. 501-515.

Cullen, I. G.,1983 "Q-Analysis and the Theory of Social Scientific Knowledge", *Environment and Planning B* Vol. 10 pp. 393-401.

For vertex specific applications of Q-Analysis see:

Gaspar, J.,and
Gould, P., 1981 "The Cova da Beira: An Applied Structural Analysis of Agriculture and Communication", in A. Pred, ed, *Space and Time in Geography: Essays Dedicated to Thorsten Hägerstrand*, CWK Gleerup Lund: Studies in Geography Ser.B. Human Geography No. 48, pp. 183-214.

The vertex specific formulation of Q-Analysis (Theory of Stars) is in;

Johnson, J. H., 1983 "Q-Analysis: a Theory of Stars", *Environment and Planning B* Vol. 10, pp. 457-69.

(2) For a comparison of Q-Analyis with conventional methodological tools analysis see:

Gould, P., 1980 "Q-Analysis, or a Language of Structure: An Introduction for Social Scientists, Geographers and Planners", *International Journal of Man-Machine Studies* Vol 13 (1980) pp. 169-99.

Gaspar, J., and Gould, P., 1981 "The Cova da Beira: An Applied Structural Analysis of Agriculture and Communication", in A. Pred, ed, *Space and Time in Geography: Essays Dedicated to Thorsten Hägerstrand*, CWK Gleerup Lund: Studies in Geography Ser.B. Human Geography No. 48, pp. 183-214.

Gould, P., 1977 "The Language of Our Investigations: Part II, Algebras", *InterMedia* Vol. 5, pp. 10-14.

Gould, P., and Johnson, J., 1980 "National Television Policy; Monitoring Structural Complexity", *Futures* Vol.12 pp.182-90.

(4) The structure of Industrial Capacity Reports of the Union of Chambers of Commerce and Industry of Turkey is discussed in:

Güvenç, M., 1989 *Industrial Geography of Greater Istanbul Metropolitan Area: An Exploratory Inquiry*, Turkish Social Science Association, Ankara (Mimeo) 240 pages.

(4) For a detailed overview on the development of Greater Istanbul see: Tekeli, I., 1992 Development of Urban Administration and Planning in the Formation of Istanbul Metropolitan Area, Chapter I in *Development of Greater Istanbul Metropolitan Area*, Greater Istanbul Municipality and the Union of Municipalities of the Marmara Region, Istanbul pp. 3-111. (forthcoming)

and Tekeli, I., 1990 "A General Evaluation of the 150 Years of Planning Experience in Istanbul" (unpublished paper)

For quantitative aspects of industrial distributions in Greater Istanbul see:

Güvenç, M., 1992 General Industrial Geography of Greater Istanbul: An Exploratory Study Chapter II in *Development of Greater Istanbul Metropolitan Area*, Greater Istanbul Municipality and the Union of Municipalities of the Marmara Region, Istanbul, pp. 112-59. (forthcoming)

CHAPTER II

ANALYSES ON THE REPRESENTATIVITY OF INDUSTRIAL GEOGRAPHIC INCIDENCE MATRICES

Whether one uses conventional Q-analysis or its vertex specific variant Theory of Stars the procedure starts with the generation of incidence matrices depicting the relation between individuals and their attributes. However if one deals with a weighted relation it had to be transformed into an incidence matrix through slicing parameters (or a slicing parameter vector). It is evident that the pattern depicted in such an incidence matrix will depend upon the values assigned to slicing parameters. Hence starting with a weighted relation one can derive a multiplicity of incidence matrices. In this study neighborhood level aggregates of industrial production factors are considered as a weighted relation and are transformed into incidence matrices with three different slicing parameter vectors. As these incidence matrices constitute the starting point of our landscape analysis it would be pertinent to start with an overview on their representativity.

Industrial landscapes of Greater Istanbul are studied from Area Code Assigned Capacity Reports files of the Union of Chamber of Commerce and Industry of Turkey. The original data file do not comprise area codes but mail addresses, so, we had to assign six digit area codes (indicating district, subdistrict and neighborhood) to some 6000 plants of the metropolis. The task was rather tedius requiring place specific information and perseverence. Evidently, it is in no way at all interesting in itself. Since major steps of the followed procedure are summarized elsewhere they will not be repeated here. (Güvenç, 1989)

Analyses on the spatial structure of industrial production factors are based upon a geographical matrix depicting neighborhood level aggregates of plant characteristics. Capacity Reports contain quantitative information on the following eleven attributes of each plant.

HIERARCHICAL Levels (N-1)	(N)
1. Number of Engineers	L
2. Number of Technicians	A
3. Number of Master Workmen [*Foremen*]	B
4. Number of Workers	O
5. Number of Administrative Personnel	R
6. Uncovered Land allocated to industrial uses	Land Use
7. Covered Land allocated to industrial uses	
8. Monetary value of industrial premises	C
(for owned plants) Real Estate Capital	A
9. Machinery capital	P
10. Circulating capital	I
11. *Other* fixed capital;	T
(value of equipment other than industrial	A
machines).	L

12. Concentration of plants (in terms of numbers only)

At a higher level of abstraction these attributes may be taken up as being covered by the following categories: a) labor, b) land and c) capital. Subsequent to geographic aggregation at neighborhood level it was possible for us to generate an additional attribute (12th) indicating the number of plants in each neighborhood. This endogeneously generated attribute enabled us to distinguish between neighborhoods characterized by a high number of small scale plants and those that host few but labor and/or land-use and/or capital intensive plants .

As of 1988, there were, according to Capacity Reports some 5985 plants scattered in no less than 502 neighborhoods of the Greater Istanbul Metropolitan Area. Consequently a comprehensive analysis of this industrial landscape necessitates that the student processes a large geographical matrix with no less than 502 rows and 12 columns. For obvious practical reasons it is impossible for us to produce a complete listing of this rather large geographical matrix here. However, to provide the reader with an order of magnitute Grand Totals for these 12 quantifiable industrial attributes are produced in Table 2.1

The metropolitan area under investigation is the same as the one used in our exploratory study (Güvenç, 1989) and comprises no less than 649 areal units (see Appendix). It follows that no less than 77 % of neighborhoods are found to host at least one plant small or large. This, we believe is an important finding depicting;

a. the dispersion of industrial establishments hence the complexity of the problem.

b. the inter-penetration of the production and reproduction spaces within the metropolis.

Table 2.1 Grand Totals for Selected Industrial Attributes of Plants within Greater Istanbul Metropolitan Area

LABOR		LAND USE		CAPITAL	
Engineers	: 6536	Unc. Area	3544.6 ha	Real Estate:	138037.6
Technicians	: 7842	Covered	898.6 ha	Machinery :	483945.3
Foremen	: 18467			Revolving Capital :	752408.9
Workers	: 192361				
Administrative:	30736			Other Fixed Capitals :	98243.3
Total	255945			Total* :	1334597.6

Source: Derived from Capacity Reports File (1988) of the Union of Chambers of Commerce and Industry of Turkey (UCCIT)

* Excludes Real Estate Capital. Capital figures are in millions of TL.

Even if difficulties that stem from industrial distributions are set aside, it is clear that, an areal unit, will, more often than not, comprise a combination of plants operating in various trades and with different scales of production. Thus, areal averages derived from small and large scale plants with different levels of land use, labor, and capital intensity would seriously affect the meaningfulness of our interpretations. So as to side-step this difficulty, one needs to find one or more discriminatory variable, that is capable to trancend sectoral variations. We will see that, as far as this study is concerned, it is possible to side-step this difficulty using the type of property ownership under which plants and industrial premises are held (i.e. rented or owned) as discriminatory variable in identifying the small and large plants. Our exploratory study covincingly illustrates that, this binary variable, in spite of its simplicity, trancends sectoral differences and is capable to discriminate between small and large plants in *general*. One could find ample empirical evidence on this issue in our exploratory study. (Güvenç, 1992) Notice also that unlike its conventional counterparts, based on more or less arbitrarily set quantitative tresholds, this variable, leaves the door open for further analyses.

The Capacity Reports files do not possess an explicit variable related to the type of ownership under which industrial premises are held. Fortunately it can be derived indirectly from the composition of its capital, since for plants operating in rented premises real estate capital is equal to zero.

Using this very simple discriminatory variable, total plant population is divided into two sub-sets, properties of which are shown in Table 2.2. The category 'rented plants' accounts for nearly 70 % of the total plant population, while its shares in terms of labor and capital are about 35 and 15 percent respectively. The category *'owned plants'* possesses complementary percentages. In other words, 65 % of the metropolitan industrial labor and 85 % of the total industrial capital are found to be concentrated in plants operating in *owned* premises which make up but 31 % of the total plant population. This of course does not exclude the possibility of finding few individual cases of capital intensive plants operating in rented premises as well as a number of small scale plants operating in owned shops. But these cases are few and do cause only minor distortions. This bi-partite classification has two important properties.

First, it enables us to go beyond sectoral differences, while producing a sharp contrast in terms of capital intensity and average plant size. Notice that as compared to those operating in *rented* premises, *owned* plants depict significantly higher average plant sizes (4.15 times), capital intensities, (12.4 times) and a higher level of capital investment per employee (3 times).

Table 2.2 Differences in the Industrial Attributes of Plants Operating in *Rented* Premises and those Operating in *Owned* Premises

	Plants in *Rented* Premises	%	Plants in *Owned* Premises	%
Number of Plants	4122	69,0	1852	31,0
Structure of Employment				
Engineers	1772	27,1	4764	72,9
Technicians	2471	31,5	5370	68,5
Master Workmen	6505	35,2	11962	64,8
Workers	69234	36,0	123123	64,0
Administrative Personel	9336	30,4	21403	69,6
Total Employment	89318	34,9	166622	65,1
Average Plant Size	21,7 employees		89,9 employees	
Composition of Capital (10^6 TL)				
Real Estate (RE)	--- *	0,0	138 037,6	100,0
Machinery	71 973,1	14,9	411 963,2	85,1
Revolving Capital	115 283,2	15,3	637 123,7	84,7
Other Fixed Capital	15 953,3	16,2	82 289,9	83,8
Totals;				
Real Estate included	203 209,6	13,8	1 269 414,4	86,2
Real Estate excluded	203 209,6	15,2	1 131 376,8	84,8
Average Plant Capital RE Capital included	49,3 (10^6 TL)		685,4	
			610,9 RE Excluded	
Capital per Employee	2,275 (10^6 TL)		7,618 RE included)	
	2,275 (10^6 TL)		6,790 (RE excluded)	

* Zero by definition

Source : Güvenç M., (1989) Industrial Geography of Greater Istanbul Metropolitan Area; an Exploratory Study

As these differences relate to total population of plants they are not subject to problems of statistical inference. Secondly, unlike those more or less arbitrarily selected and hardly interpretable discriminatory threshold levels or discriminatory multi-variate functions. Notice also that this variable leaves the door open for further economic and industrial geographic investigations. Unfortunately, we do not, for the moment have at our disposal detailed empirical studies devised to provide explanations for this rather interesting bi-partite division of the total plant population. And unless these mechanisms are studied in detail, attempts to account for this dual industrial structure with antagonistic properties are bound to be in speculative terms. We do not know, for instance, to what extent risks and insecurity associated with tenants legal position, accounts for their reticence to adopt capital intensive production processes, to invest in machinery or to adopt new technologies. One could possibly enumerate a number of reasons pointing out to the narrow bargaining margins of a tenant manufacturer especially in trades, such as printing and publishing, where machines could not be moved unless they are dismantled to a large extent. Hence plant movements would be onerous in terms of time and money. Secondly, plant movements would be associated with a loss of *clientèle* especially for small scale plants who seldomly use a marketing agent. Last but not least, in vertically disintegrated production complexes, locational change would deprive the entrepreneur from previously established sub-contracting networks, and/or from the center of gravity of the labor pool.

All these seem to imply that the degree of vulnerability of tenant manufacturers would significantly be higher than that of tenants in the housing market. On the other hand, production complexes generated by these tenant manufacturers which use labor intensive and skill dependent production processes can not be located further apart from the center of gravity of their labor pools. Our exploratory study shows that as far as Beyoğlu and Istanbul Sides are concerned (specialized in labor intensive trades) the center of gravity of plant distribution is located not far from the center of gravity of the distribution of population. It follows that in these sectors industrial establishments had to compete with other land uses. In other words rents should be relatively high. Which would slow down the capital accumulation process.

Gaspar and Gould's (1981) study on the adoption of innovations in agriculture convincingly illustrates the fact that the insecurity associated with tenants legal position leads to an understandable reticence on their part to adopt technological innovations. While we are not in a position to assess its role in the field of intra-metropolitan industrial location, the contrast depicted in Table 2.2 suggests that land ownership can be used as a macro level discriminatory variable to differentiate between small and large scale establishments. It is evident that issues that we have raised above, can only be settled through detailed empirical studies well beyond the scope of this study. However, while the generating mechanisms of this bi-partite division remain to be discovered, the structural contrast depicted in Table 2.1 suggests that empirical studies on the general industrial geography of the metropolis would be especially relevant and illuminating, only if students pay attention to this distinction.

Our studies on the general industrial geography of the metropolis are carried out with the following three plant populations;

a. Total plant population

b. Small plants (tenants)

c. Large plants (land owners)

and at two different scales, using;

a. an overall slicing parameter vector derived from the distribution of total plant population assuming an even distribution of production factors amongst 502 neighborhoods.

b. category specific slicing parameter vectors derived from the distribution of small and large plants, again, assuming an even distribution of production factors amongst neighborhoods.

Numerical values of each entry in these three different slicing parameter vectors are shown in Table 2.3. Loading these different threshold levels on a scanning procedure we have obtained following five representations of the industrial landscapes of Greater Istanbul as incidence matrices.

1. General Industrial Geography of Greater Istanbul Metropolitan Area. (Using first slicing parameter vector in Table 2.3)
2. Industrial Geography *of Large* Plants within Greater Istanbul (as it is *seen through* the first slicing parameter vector in Table 2.3 derived from the distribution of total plants
3. Industrial Geography of Small Plants within Greater Istanbul (as it is *seen through* the first slicing parameter vector in Table 2.3 derived from the distribution of total plant population)

4. Industrial Geography of *Small* Plants within Greater Istanbul (as it is ***seen through*** category specific slicing parameters; ie. according to entries shown in the second column of Table 2.3.

5. Industrial Geography of *Large* Plants within Greater Istanbul (as it is *seen through* category specific slicing parameters; ie. according to entries shown in the third column of Table 2.3.

Table 2.3 Numerical Values Assigned to Different Slicing Parameter Vectors

	Slicing Parameters for		
ATTRIBUTES	General Industrial geography [1/n]	Industrial Geography of *Small* Scale Plants	Industrial of *Large* Scale Plants
Plants	12	10	5
Engineers	13	4	13
Technicians	16	6	14
Master workmen	37	15	32
Workers	384	160	334
Administrative Personel	61	22	58
Uncovered Land	7,1 Ha	1,1 Ha	8,3 Ha
Covered Land	1,8 Ha	0.6 Ha	1,7 Ha
Real Estate Capital	276,1 10^6		374,0 10^6
Machinery	976,9 10^6	166,3 . 10^6	1 164,4 10^6
Revolving Capital	1 504,8 10^6	266,3 . 10^6	1 726,6 10^6
Other fixed capitals	196,5 10^6	36,9 . 10^6	223,0 10^6

Source : Derived from Area Code Assigned *Capacity Reports* (1988) file through CCIS Procedure

These incidence matrices are then presented as bi-colored simplex diagrams in which neighborhoods are denoted in columns and attributes in rows. For the facility of exposition neighborhoods that are important in none of the attributes are filtered out. On the other hand, for the ease of interpretation, those that are not excluded are presented in the ascending order of their distances to the center of gravity of the distribution of metropolitan population which, in 1988 was found to be at the Eminönü entrance of the Galata Bridge. (Güvenç, 1992)

As we are concerned with spatial differentiation and as it is repeatedly emphasized in our exploratory study to do so, simplices in different sides are separately mapped. As we have five different representations and three disconnected geographical components we have obtained in all fifteen simplex *maps* which depict changes taking place in the combination of attributes with increasing distance to the center of the metropolis.

The first three (ie. Figures 2.1.a, 2.1.b, 2.1.c) represent industrial geographic features of neighborhoods in Istanbul, Beyoglu, and Anatolian sides respectively, when; the distribution of total plant population is considered and when slicing parameters are set to levels shown in the first column of Table 2.3.

Figures 2.2.a, 2.2.b, and 2.2.c represent the industrial landscape generated by the distribution of *small* plants, in Istanbul, Beyoglu, and Anatolian sides respectively and as it is *revealed through* slicing parameters derived from the distribution of total population. (first column in Table 2.3)

Figures 2.3.a, 2.3.b, and 2.3.c represent the industrial landscape generated by the distribution of *large* plants, in Istanbul, Beyoglu, and Anatolian sides respectively and as it is *revealed through* slicing parameters derived from the distribution of total population. (first column in Table 2.3)

Figures 2.4.a, 2.4.b, and 2.4.c represent the industrial landscape generated by the distribution of *small* plants, in Istanbul, Beyoglu, and Anatolian sides respectively, as it is *revealed through* category specific slicing parameters shown in the second column of Table 2.3.

Figures 2.5.a, 2.5.b, and 2.5.c represent the industrial landscape generated by the distribution of *small* plants, in Istanbul, Beyoglu, and Anatolian sides respectively, as it is *revealed through* category specific slicing parameters shown in the third column of Table 2.3.

These diagrams are important for two particular reasons. First, they could easily be re-translated into standart map format using the list of area codes produced in Appendix I. Even in this form it is possible to consider them as qualitative industrial maps that could eventually be useful in selecting study areas for empirical surveys or for the assessment of structural contributions from various places or in situating different sectors of the metropolitan area within the production space of the metropolis.

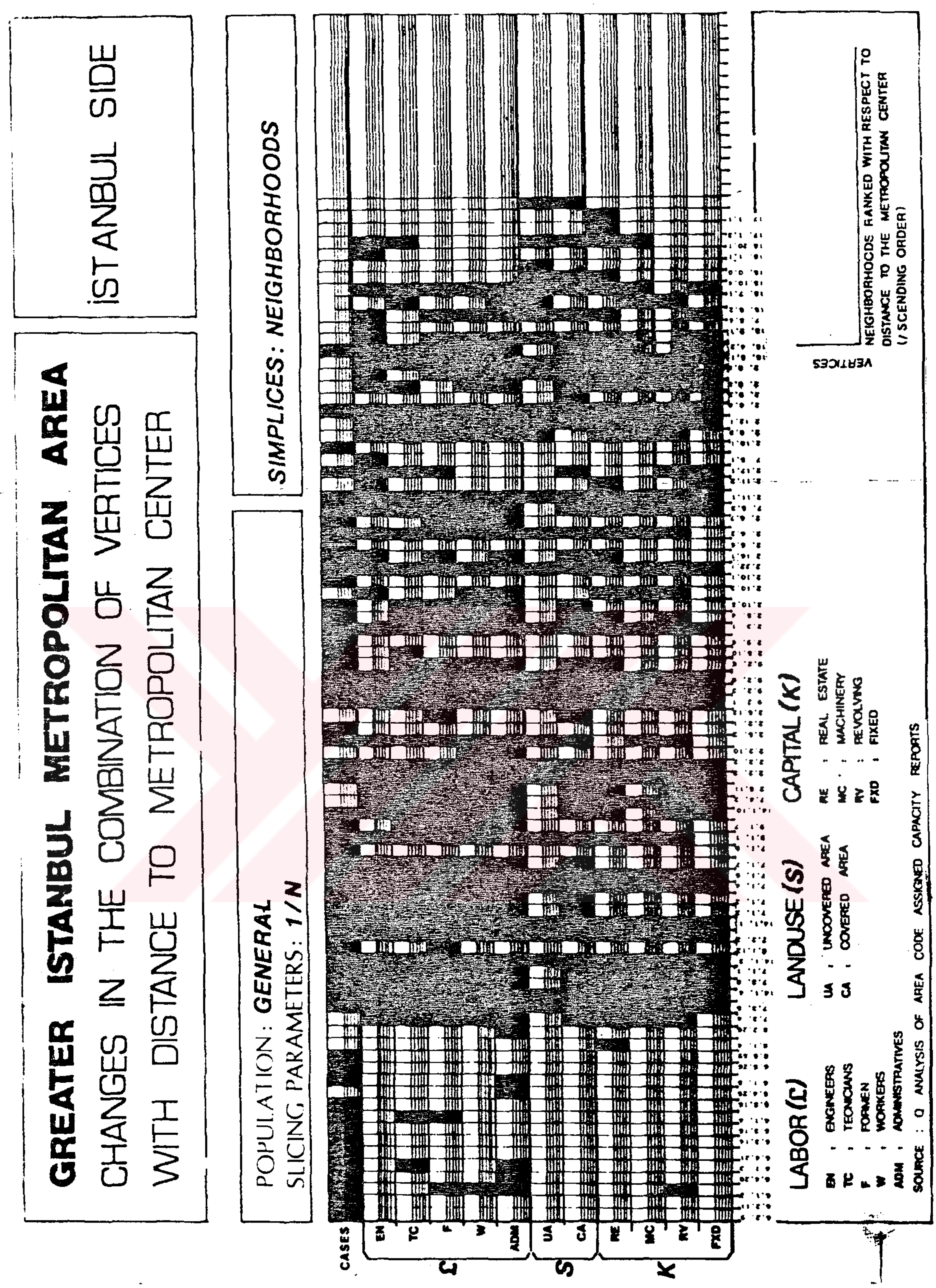


Figure 2.1. a Istanbul Side; Bicolored Graph for Total Plant Population

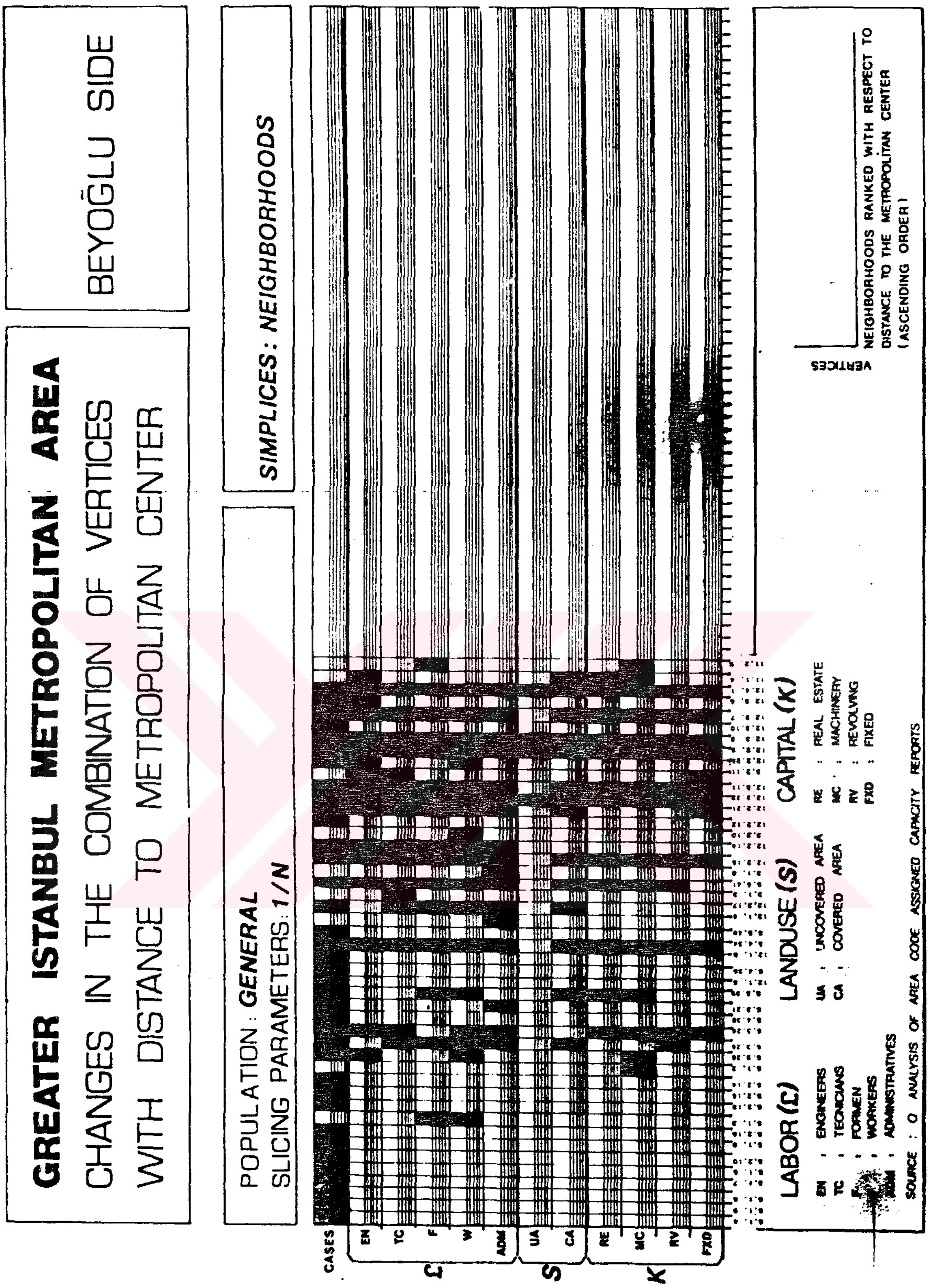


Figure 2.1. b Beyoglu Side; Bicolored Graph for Total Plant Population

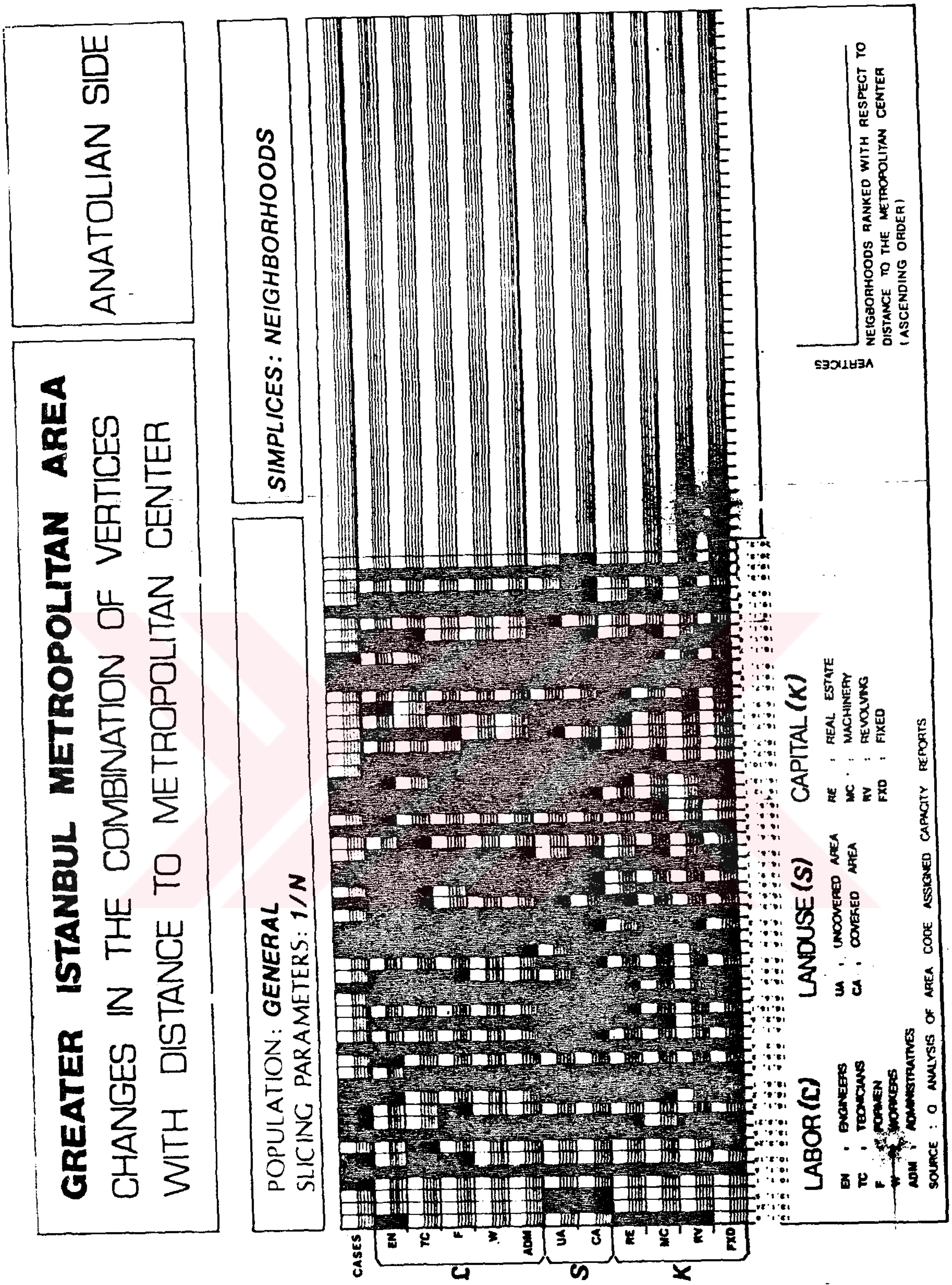


Figure 2.1. c Anatolian Side; Bicolored Graph for Total Plant Population

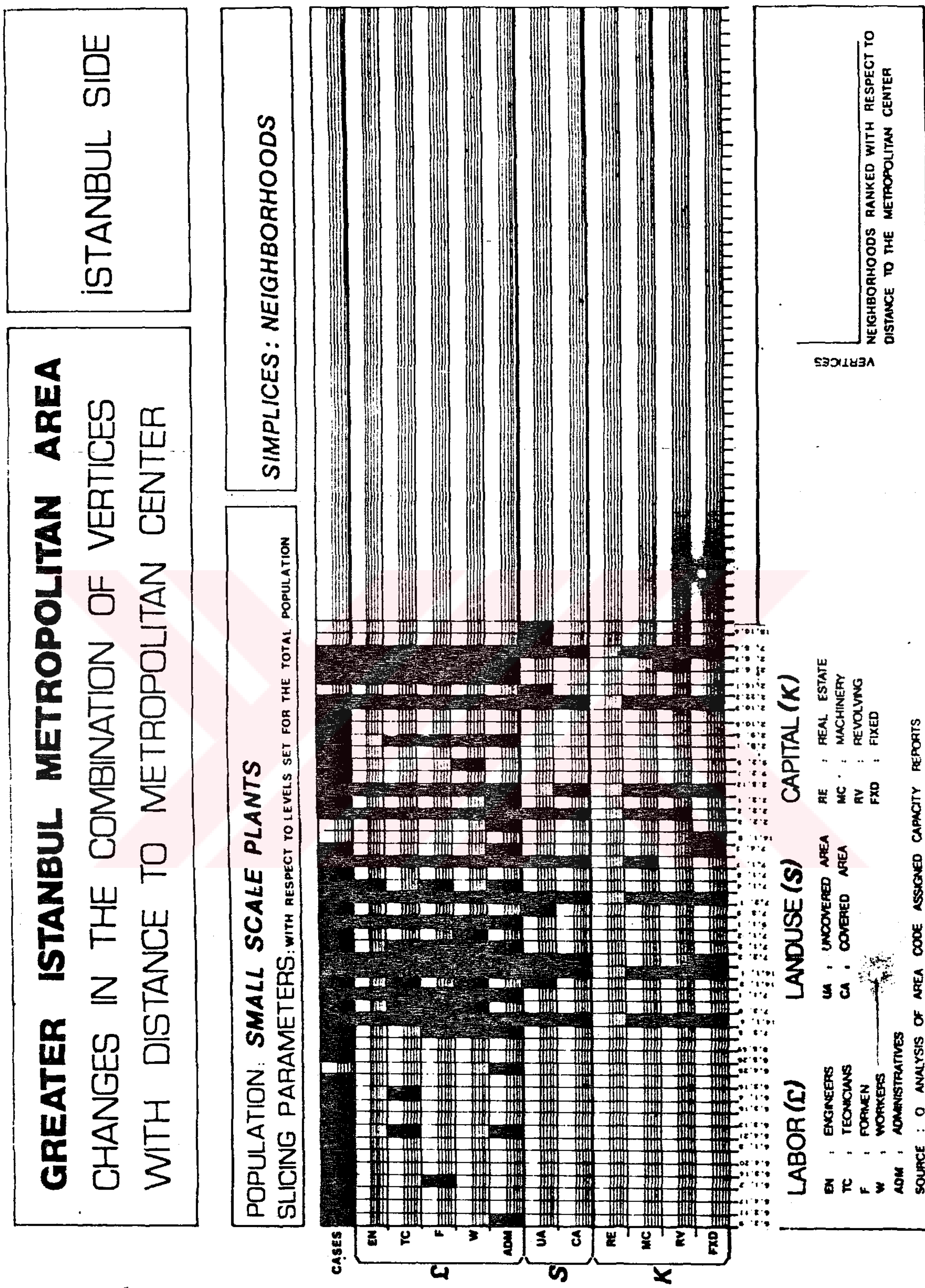


Figure 2.2. a Istanbul Side; Bicolored Graph for Small Plants
(Slicing Parameters: Derived from Total Plants)

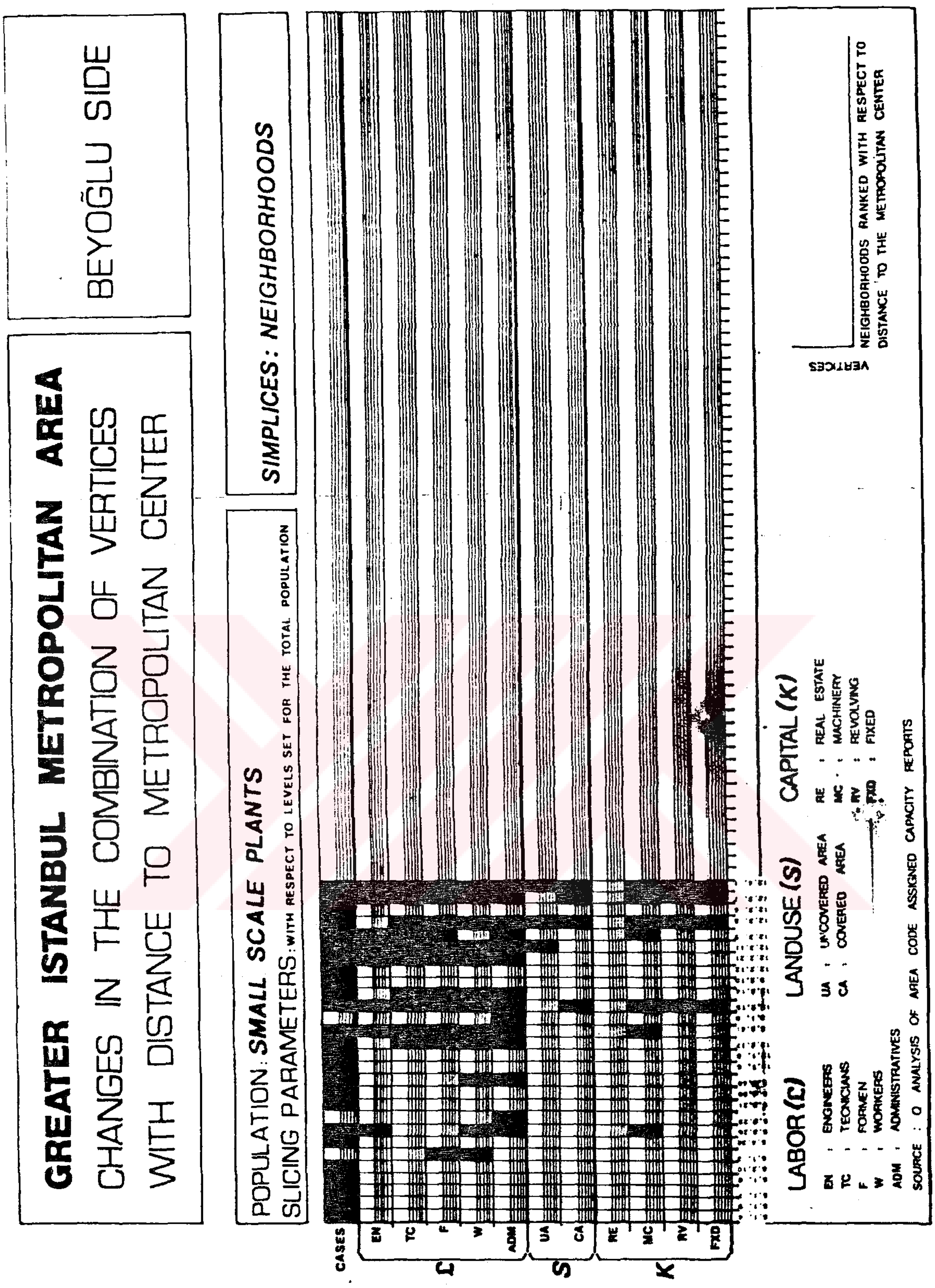


Figure 2.2. b Beyoglu Side; Bicolored Graph for Small Plants
(Slicing Parameters: Derived from Total Plants)

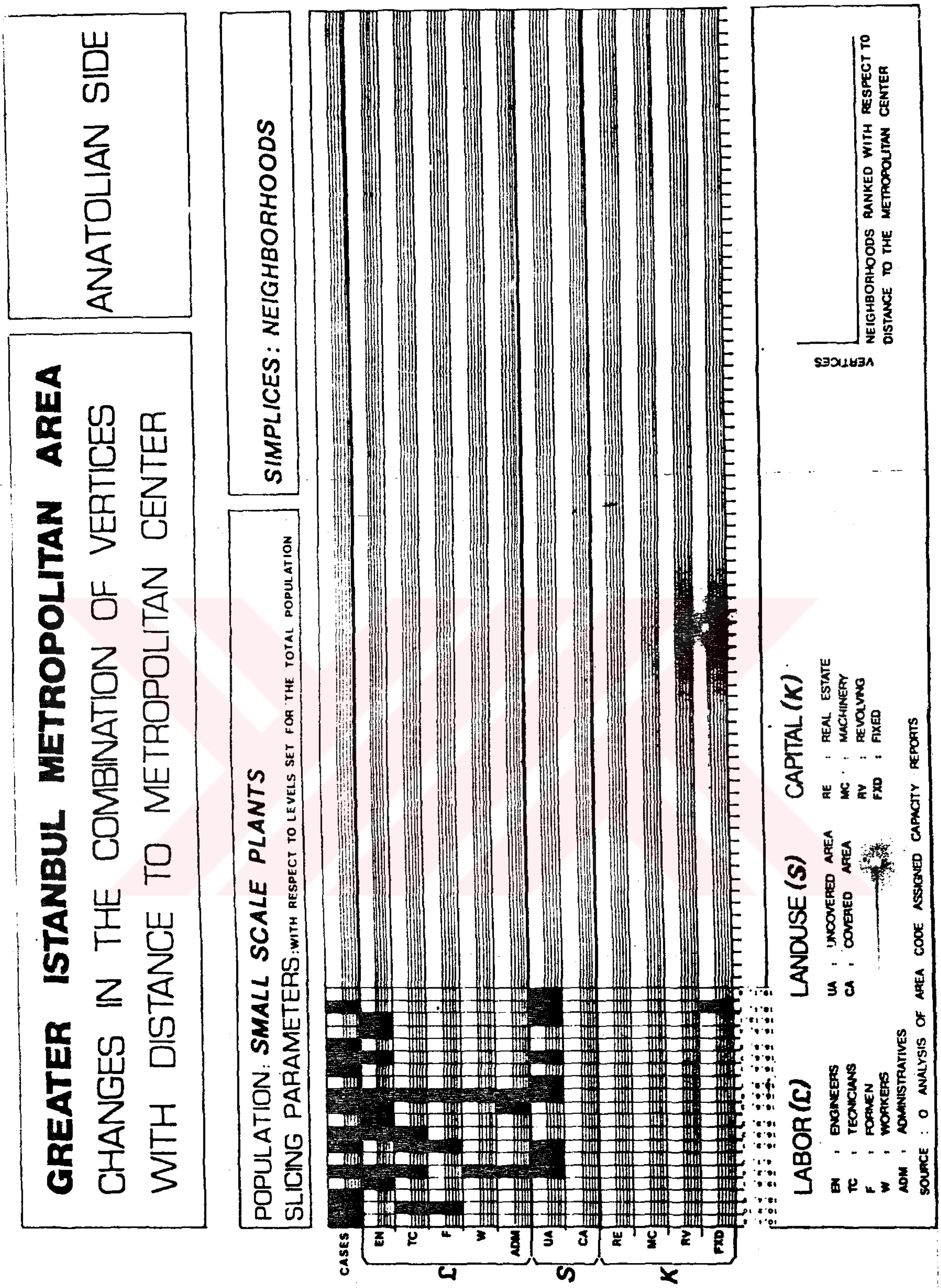


Figure 2.2. c Anatolian Side; Bicolored Graph for Small Plants (Slicing Parameters: Derived from Total Plants)

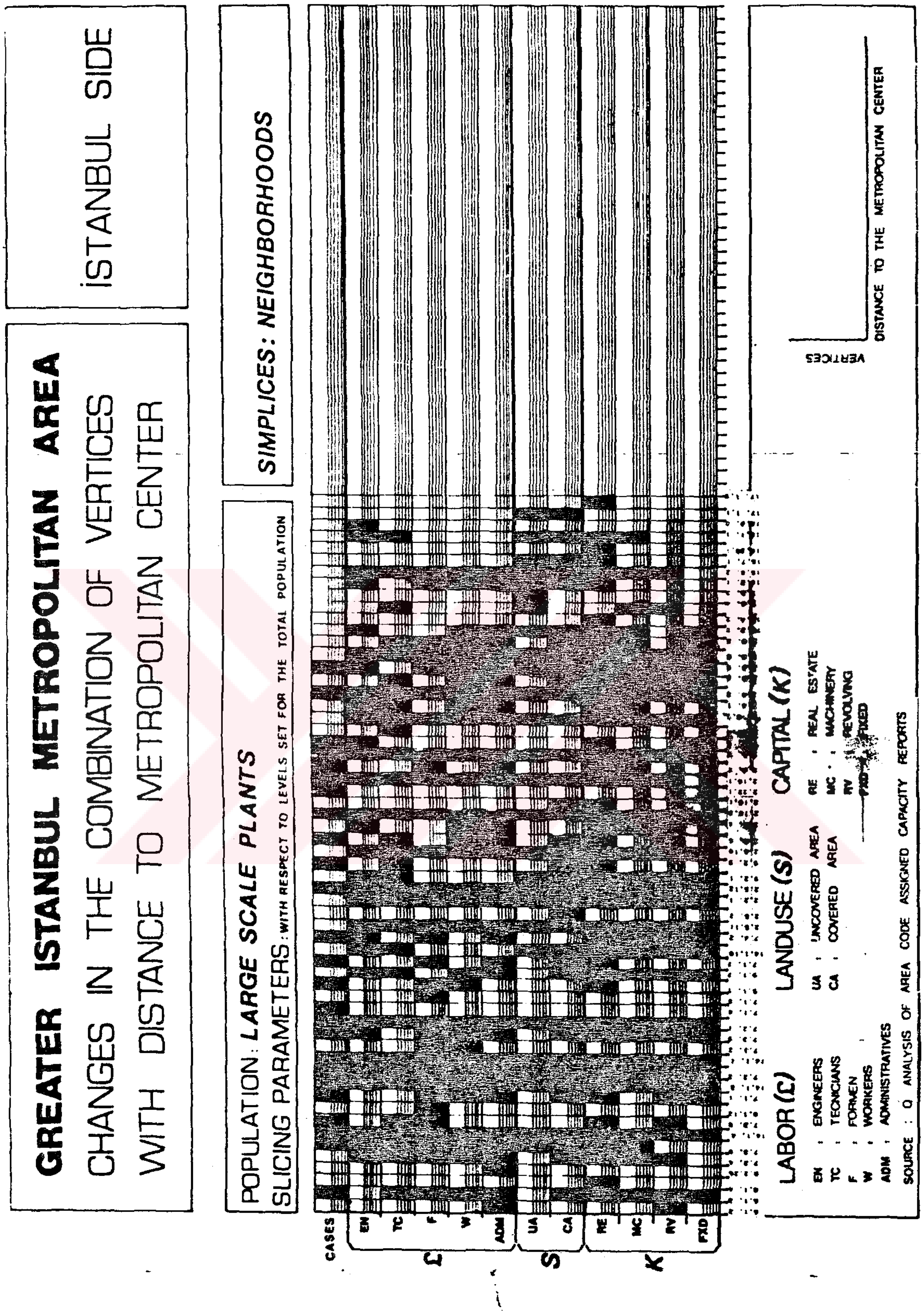


Figure 2.3. a Istanbul Side; Bicolored Graph for Large Plants (Slicing Parameters: Derived from Total Plants)

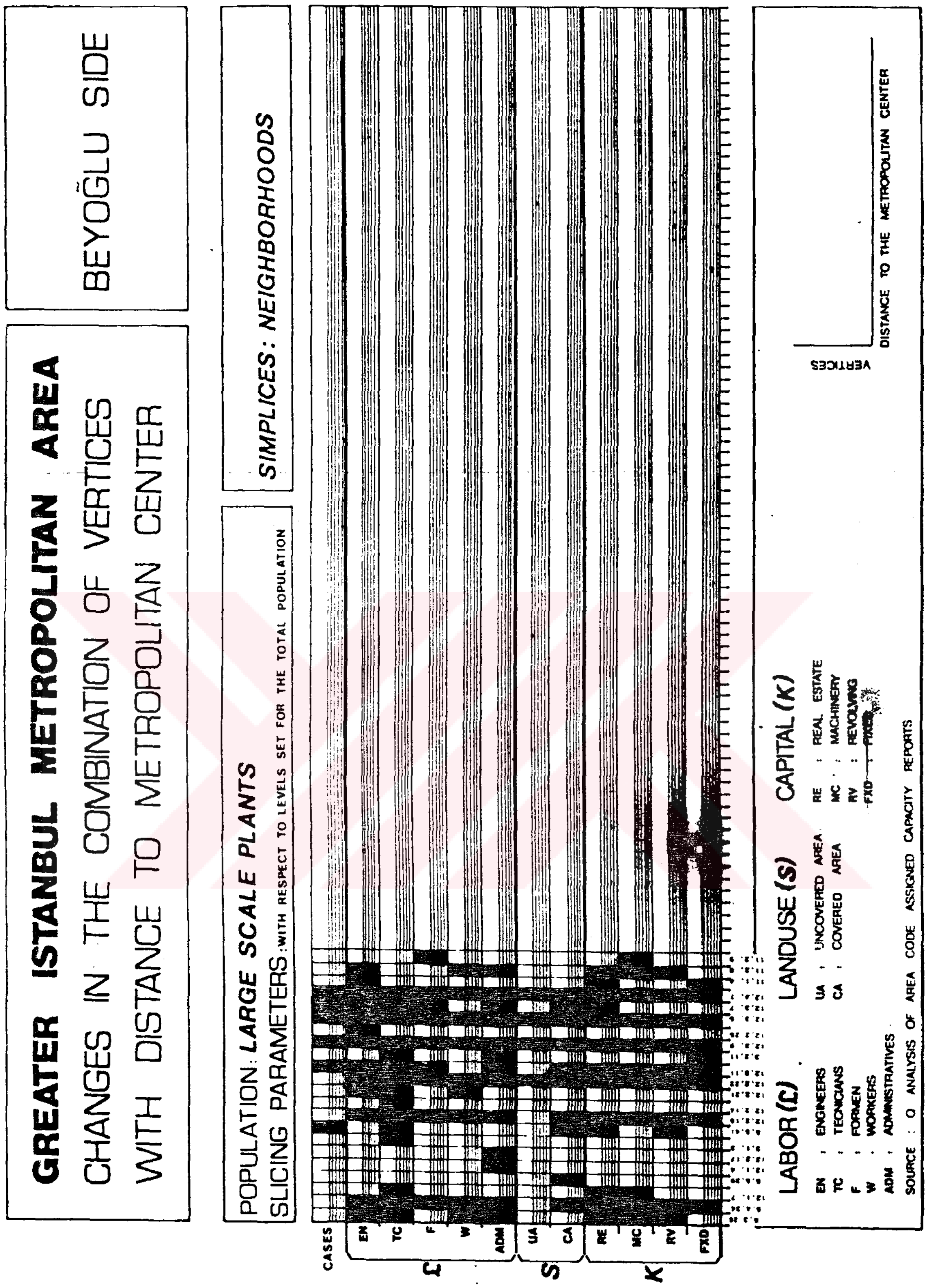


Figure 2.3. b Beyoglu Side; Bicolored Graph for Large Plants (Slicing Parameters: Derived from Total Plants)

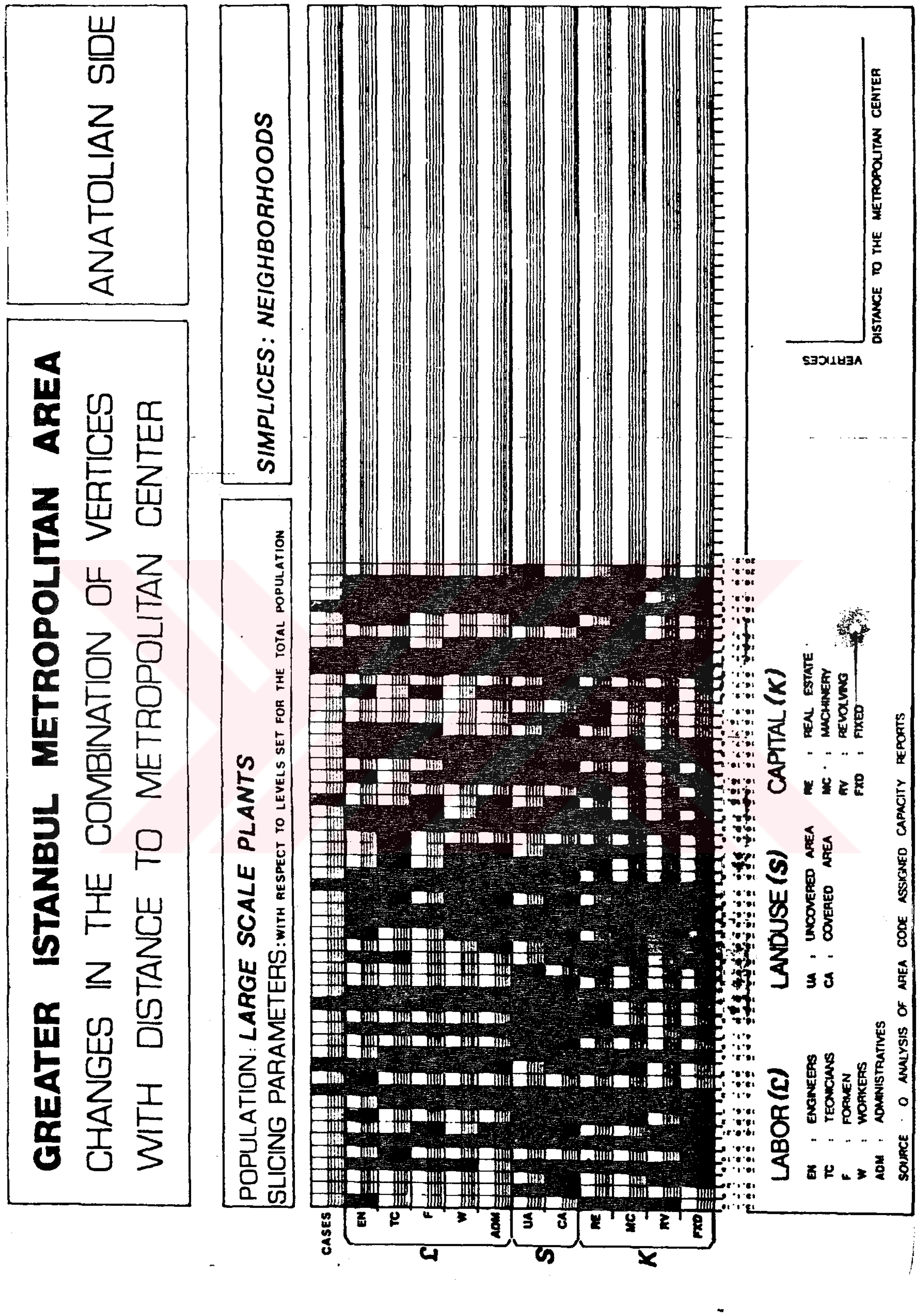


Figure 2.3. c Anatolian Side; Bicolored Graph for Large Plants
(Slicing Parameters: Derived from Total Plants)

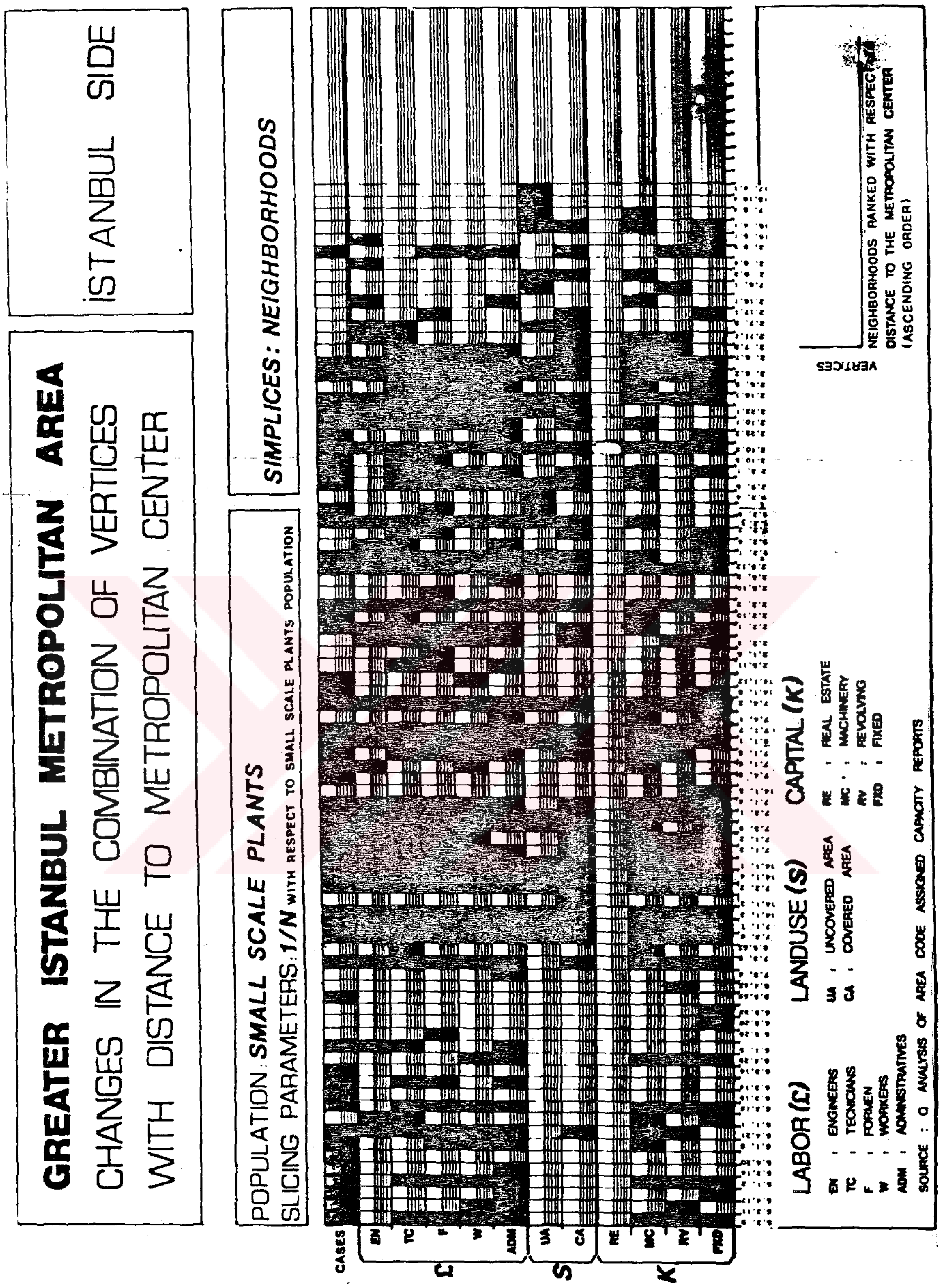


Figure 2.4. a Istanbul Side; Bicolored Graph for Small Plants (Slicing Parameters Group Specific)

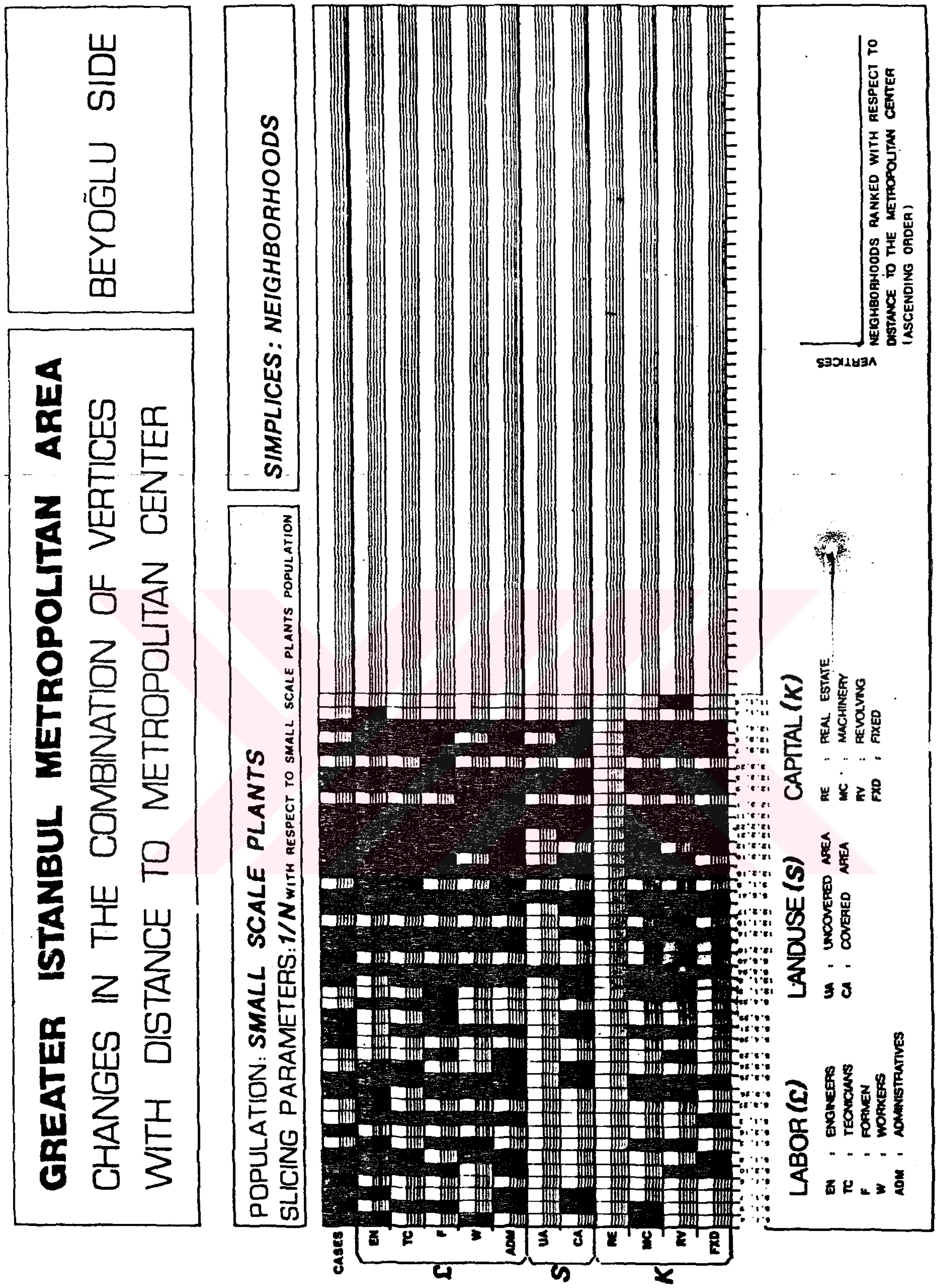


Figure 2.4. b Beyoglu Side; Bicolored Graph for Small Plants
(Slicing Parameters Group Specific)

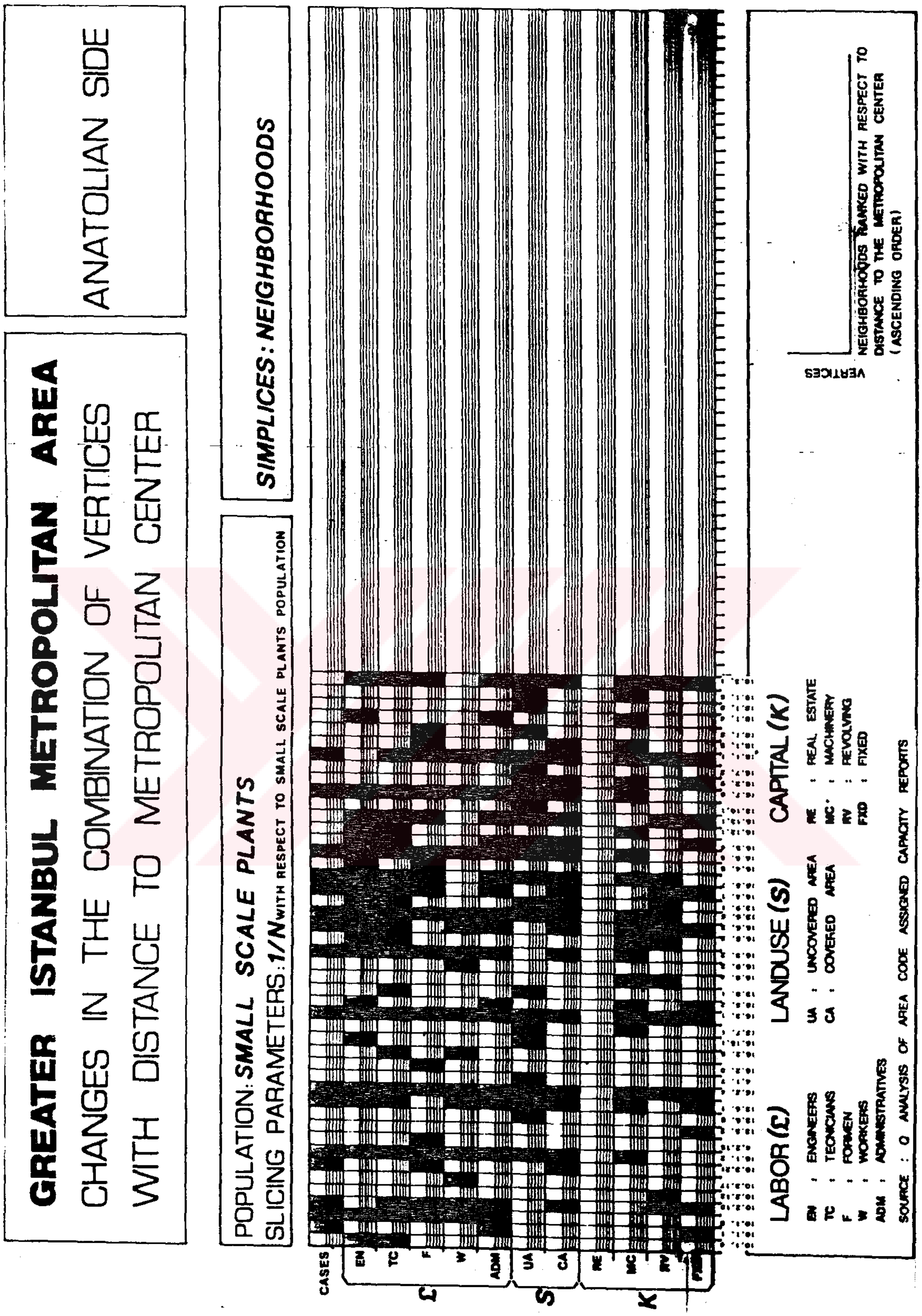


Figure 2.4. c Anatolian Side; Bicolored Graph for Small Plants (Slicing Parameters Group Specific)

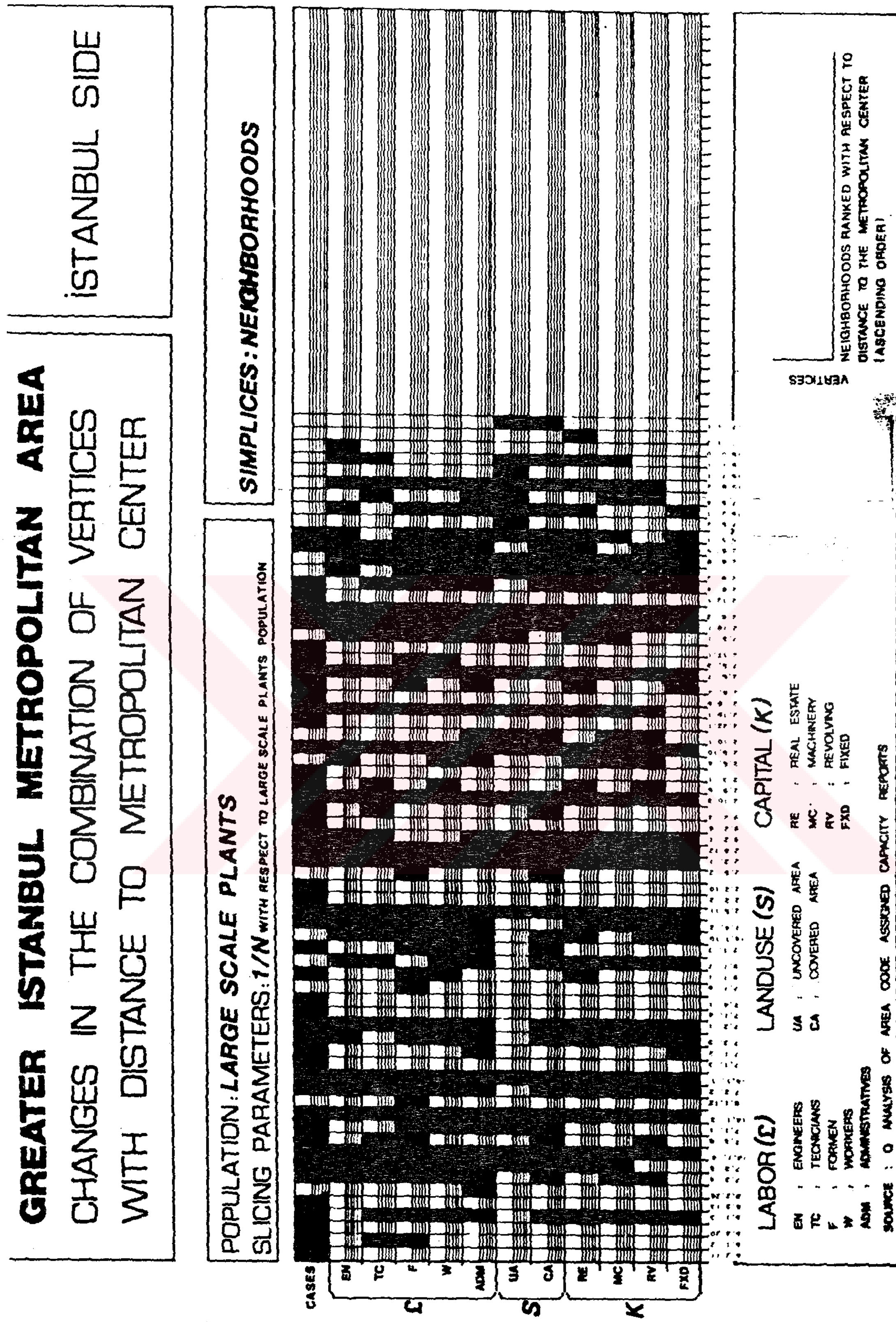


Figure 2.5. a Istanbul Side; Bicolored Graph for Large Plants (Slicing Parameters Group Specific)

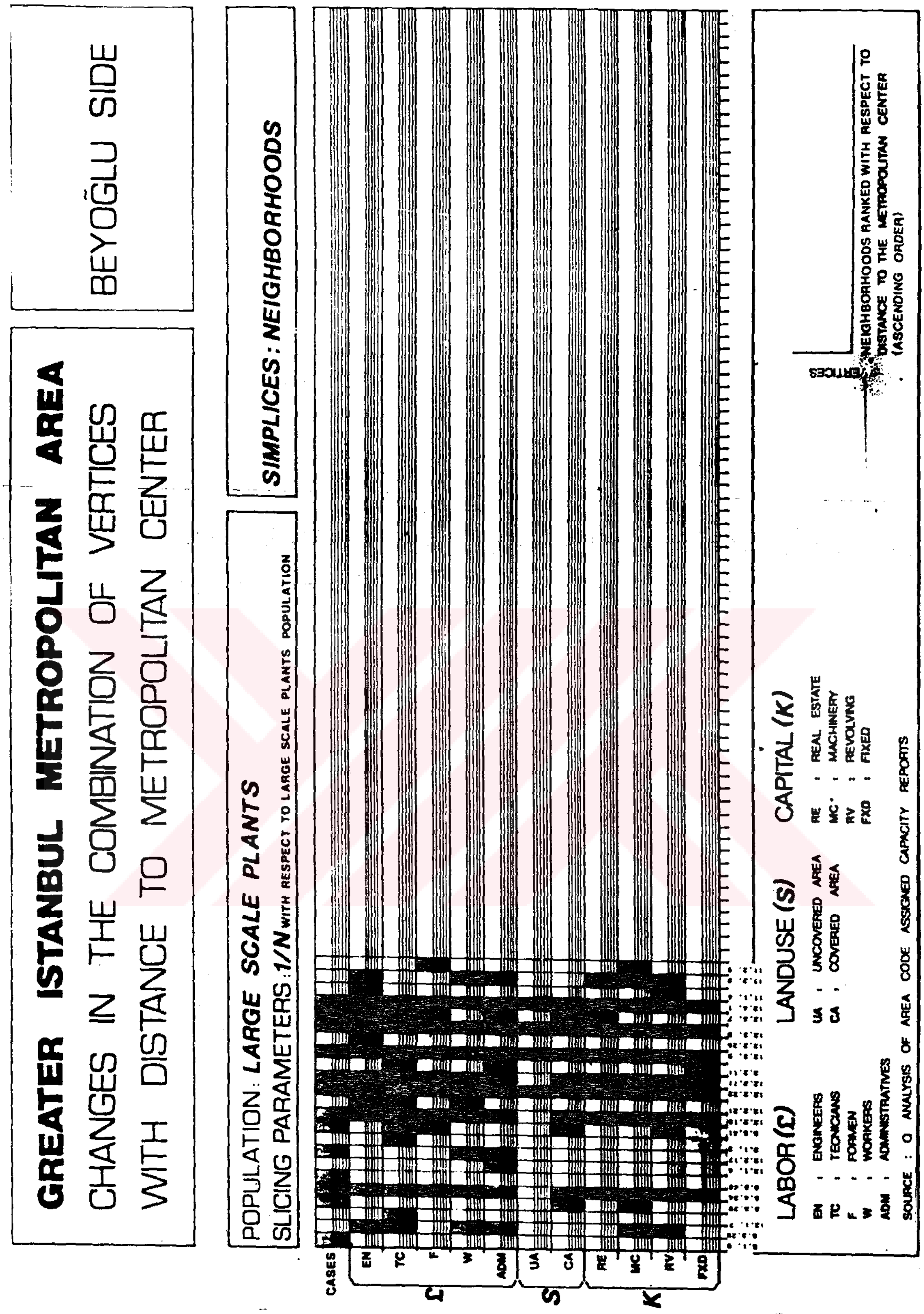


Figure 2.5. b Beyoglu Side; Bicolored Graph for Large Plants (Slicing Parameters Group Specific)

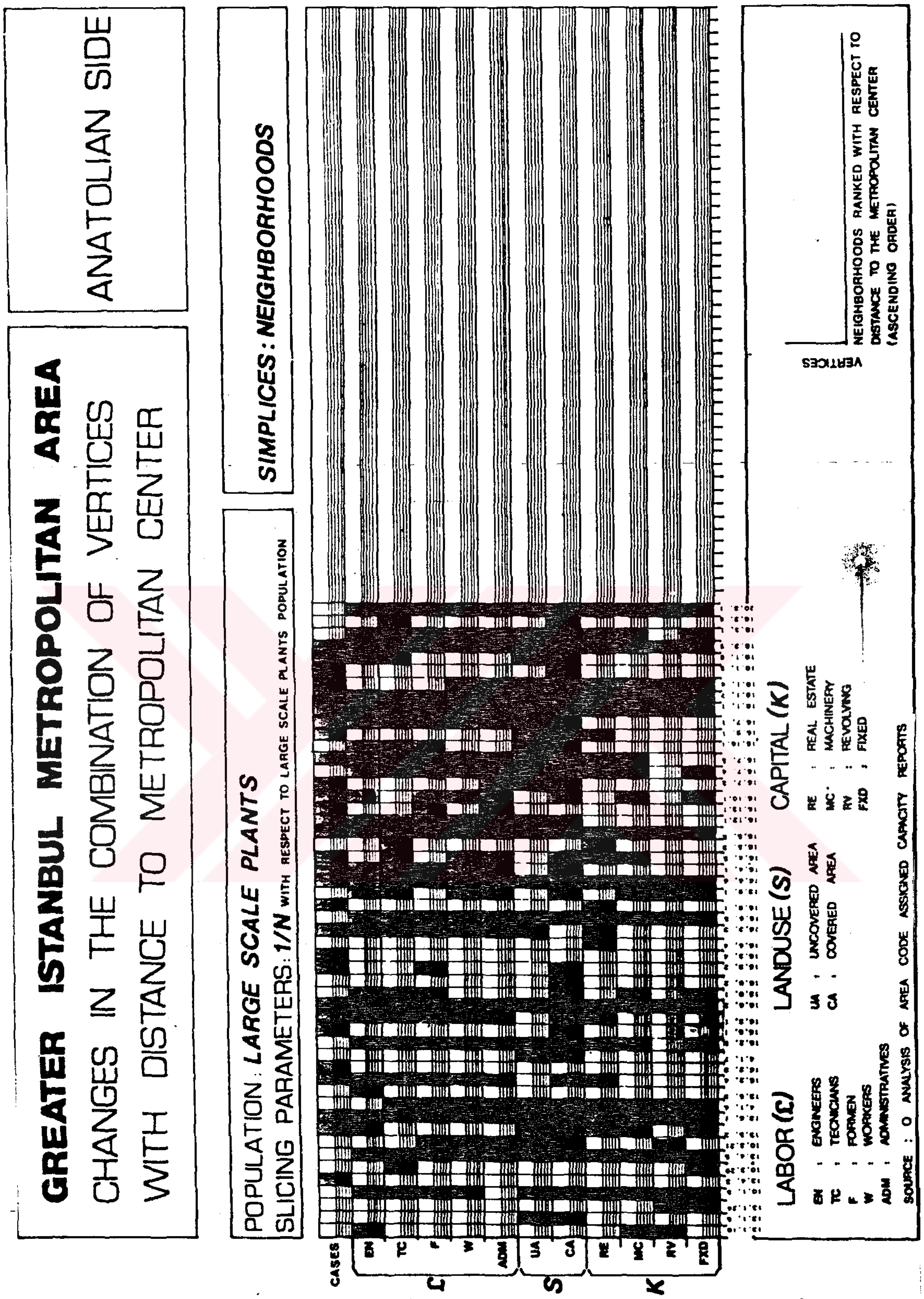


Figure 2.5. c Anatolian Side; Bicolored Graph for Large Plants (Slicing Parameters Group Specific)

Secondly these representations will be useful in interpreting matrices of gamma indices. As we are going to see, in the third chapter this index of areal association treats the co-presence of binary attributes in the same way as it treats the simultaneous absence of attributes. But, in geographic studies students would like to know whether high areal association indices stem from the co-presence or from the simultaneous (co-)absence of related attributes. The particularly high number of references to these diagrams in chapters three and four suggest that the latter are in fact extremely useful for interpretations. These remarks illustrate the extremely important role assumed by these representations. So it would be pertinent to start with an overview on their representativity.

Figures 2.1.a to 2.1.c clearly show that some neighborhoods are *important* in terms of all industrial attributes while others are important in only one of the twelve attributes taken into account and that the number of neigborhoods presented is well below 502 as stated previously. In fact Figures 2.1.a to 2.1.c comprise some 185 neighborhood simplices in all. Thus some 317 neghborhoods which make up no less than 63 percent of neighbordoods are filtered out as they are invisible at this scale of the analysis. This of course is a highly interesting simplification but what about loss of information associated with this simplification. The information loss incurred can of course be calculated as it will be equal to shares accounted by neighborhoods that are filtered out in terms of different industrial attributes. Hence by summing up attribute shares accounted by neighbornoods that are ***not*** filtered out we can get an overall assessment of the overall representativity of the bi-colored graphs shown in Figures 2.1.a to 2.1.c. Shares accounted by neighborhoods at each q-level are shown in Table 2.4.

Attributes shares shown in Table 2.4 suggest that the loss of information incurred can, for all practical purposes, be considered as negligeable. For instance filtering out no less than 63 % of neighborhoods, we exclude only 1.2 % of the total machinery capital. Notice also that neighborhoods that are not filtered out account for no less than 95 % of total industrial capital and no less than 90 % of total industrial empoyment. Moreover, loss of information in terms of covered and uncovered industrial land is in the same order of magnitude. The greatest loss of information takes places in terms of Number of Plants even here those neighborhoods that are not filtred out account for no less than 82 % of the total plant population. Notice in passing that contributions show a parallel decrease to the decrease in q-levels and that 29 out of a total of 185 (15.6 %) of neighborhoods that appear as 11-simplices account for more than half of the total industrial capital, half of the covered production space, about 40 % of uncovered land, and half of employment.

Hence, attributes shares accounted by neighborhoods produced in Figures 2.1.a to 2.1.c. can be considered to be adequate in quantitative terms.

Table 2.4 Attribute Shares Accounted by Neighborhoods Classified at Different q - Levels

	Q - L E V E L S												
ATTRIBUTES	11	10	9	8	7	6	5	4	3	2	1	0	Total
Plants	,355	,107	,051	,019	,020	,043	,025	,015	,006	,020	,026	,131	,820
L A B O R													
Engineers	,533	,095	,096	,041	,029	,020	,023	,004	,019	,015	,019	,035	,930
Technicians	,499	,111	,089	,026	,035	,026	,027	,008	,011	,019	,020	,044	,916
M, Workmen	,481	,133	,082	,029	,027	,023	,022	,012	,008	,017	,023	,049	,905
Workers	,502	,098	,087	,033	,032	,025	,019	,007	,011	,013	,021	,054	,902
Administrative Personnel	,515	,105	,070	,033	,035	,020	,026	,012	,011	,013	,011	,053	,906
L A N D U S E*													
U, Area	,397	,083	,065	,028	,020	,024	,016	,197	,013	,025	,037	,052	,958
C, Area	,502	,106	,105	,032	,030	,025	,017	,005	,007	,019	,033	,039	,920
C A P I T A L													
Real Estate	,559	,109	,092	,035	,027	,017	,020	,005	,007	,016	,014	,065	,965
Machinery	,546	,163	,085	,034	,022	,022	,024	,013	,013	,020	,018	,028	,988
Revolving	,639	,110	,057	,034	,021	,022	,022	,013	,011	,006	,012	,020	,966
Other Fixed	,522	,096	,161	,040	,017	,015	,010	,004	,008	,012	,026	,059	,970

Source : Shares accounted by each neighborhood computed through *CCIS* System are regrouped according to results of Q-Analysis.

* U. Land Denotes Uncovered Area

* C. Land Denotes Covered Area

But we know that it is one thing to be representative in quantitative terms and quite another to be representative in spatial terms. For this particular check we have separated out simplices that belong to different geographic components and carried out this exercice on representativity on a geographically disaggregated basis. The spatial distribution of these shares are shown in Tables 2.5 to 2.7 below.

Table 2.5 *Istanbul Side*; Attribute Shares Accounted by Neighborhoods Classified at Different q - Levels

	Q - L E V E L S												
ATTRIBUTES	11	10	9	8	7	6	5	4	3	2	1	0	Total
Plants	,254	,052	,025	,014	,006	,036	,009	,013	-	,012	,013	,060	,495
L A B O R													
Engineers	,228	,030	,023	,024	,005	,010	,011	,002	-	,006	,007	,009	,354
Technicians	,250	,040	,030	,021	,005	,016	,008	,006	-	,013	,007	,012	,407
M. Workmen	,273	,054	,044	,019	,006	,016	,010	,010	-	,007	,007	,021	,467
Workers	,301	,045	,032	,025	,008	,016	,009	,006	-	,006	,008	,019	,475
Administrative Personnel	,271	,050	,025	,024	,007	,011	,014	,011	-	,008	,012	,022	,455
L A N D U S E													
U. Area*	,137	,016	,028	,012	,006	,004	,007	,195	-	,005	,005	,010	,426
C. Area	,298	,049	,055	,023	,007	,015	,008	,003	-	,008	,009	,017	,489
C A P I T A L													
Real Estate	,277	,041	,036	,023	,006	,007	,012	,004	-	,007	,003	,017	,432
Machinery	,281	,049	,033	,019	,002	,008	,016	,004	-	,010	,003	,014	,442
Revolving	,332	,028	,027	,030	,004	,007	,017	,012	-	,004	,003	,008	,471
Other Fixed	,289	,025	,112	,022	,005	,005	,003	,003	-	,007	,003	,048	,523

Source : Shares accounted by each neighborhood computed through *CCIS* System are regrouped according to results of Q-Analysis.

* U. Land Denotes Uncovered Area
* C. Land Denotes Covered Area

Table 2.6 *Beyoglu Side*; Attribute Shares Accounted by Neighborhoods Classified at Different q - Levels

	Q - L E V E L S											
ATTRIBUTES	11	10	9	8	7	6	5	4	3	2	1	0	Total
Plants	,045	,051	,005	-	,007	,003	,014	-	,005	,003	,007	,064	,204
L A B O R													
Engineers	,088	,035	,006	-	,013	,001	,009	-	,013	,006	,006	,019	,195
Technicians	,080	,034	,006	-	,014	,003	,015	-	,006	,001	,005	,024	,189
M.Workmen	,054	,038	,008	-	,006	,004	,010	-	,003	,001	,009	,024	,157
Workers	,069	,031	,005	-	,012	,007	,009	-	,004	,004	,007	,031	,178
Administrative Personnel	,095	,030	,003	-	,010	,005	,010	-	,007	,001	,005	,026	,193
L A N D U S E													
U. Area*	,044	,005	,001	-	,001	,002	,002	-	,002	,000	,001	,002	,060
C. Area*	,058	,027	,004	-	,007	,005	,006	-	,003	,000	,004	,016	,129
C A P I T A L													
Real Estate	,072	,016	,003	-	,003	,000	,006	-	,003	,003	,002	,016	,123
Machinery	,083	,019	,004	-	,004	,001	,006	-	,005	,008	,005	,010	,144
Revolving	,098	,023	,004	-	,005	,014	,005	-	,007	,001	,005	,010	,169
Other Fixed	,064	,034	,001	-	,004	,000	,005	-	,006	,001	,001	,007	,124

Source : Shares accounted by each neighborhood computed through *CCIS* System are regrouped according to results of Q-Analysis.

* U. Land Denotes Uncovered Area

* C. Land Denotes Covered Area

Table 2.7 *Anatolian Side*; Attribute Shares Accounted by Neighborhoods Classified at Different q - Levels

	Q - L E V E L S											
ATTRIBUTES	11	10	9	8	7	6	5	4	3	2	1	0 Total
Plants	,055	,004	,021	,005	,011	,005	,001	,002	,001	,006	,006	,006	,124
L A B O R													
Engineers	,218	,030	,067	,018	,011	,009	,003	,002	,006	,004	,006	,007	,381
Technicians	,169	,037	,053	,006	,016	,006	,003	,002	,005	,005	,008	,008	,319
M. Workmen	,154	,041	,038	,010	,015	,003	,002	,002	,005	,008	,006	,005	,288
Workers	,131	,022	,050	,008	,012	,003	,001	,001	,007	,004	,006	,005	,249
Administrative Personnel	,150	,026	,043	,009	,018	,004	,002	,001	,005	,003	,005	,005	,269
L A N D U S E													
U.Area*	,216	,062	,035	,018	,014	,014	,003	,002	,011	,012	,030	,040	,466
C.Area*	,146	,029	,046	,010	,016	,005	,003	,002	,004	,008	,020	,006	,295
C A P I T A L													
Real Estate	,210	,052	,054	,011	,018	,010	,001	,002	,004	,007	,009	,032	,412
Machinery	,183	,095	,048	,015	,016	,013	,002	,001	,007	,002	,010	,004	,396
Revolving	,208	,060	,027	,004	,013	,001	,000	,000	,004	,002	,004	,001	,325
Other Fixed	,169	,037	,049	,018	,007	,009	,002	,000	,002	,003	,013	,003	,284

Source : Shares accounted by each neighborhood computed through *CCIS* System are regrouped according to the results of Q-Analysis.

* U. Land Denotes Uncovered Area

* C. Land Denotes Covered Area

According to our exploratory study, Istanbul, Beyoglu and Anatolian Sides of the metropolitan area account for:

- 59, 24 and 17 percent of establishments (in the same order)
- 53, 20, and 27 percent of total employment and
- 49, 17, and 33 percent of total capital. (Güvenç, 1992) If we compare these figures with totals produced in Tables 2.5. to 2.7 we see that information losses are negligeable geographically as well. Thus patterns shown in Figures 2.1.a to 2.1.c can be taken up as a representative account of the general industrial geography of Greater Istanbul Area. But if these bi-colored diagrams constitute a relevant and spatially representative account of the distribution of production factors on the metropolitan area they could possibly considered as a data base for the analysis of associative and dissociative spatial relations amongst different factors of industrial production.

Now, although we do not have a clear cut definition for the field of human geography and even less so a definition for the field of industrial geography, it is our contention that it is also a study of associative and dissociative spatial relations amongst geographical individuals or attributes of these individuals.

The conclusion is that if indices capable to distinguish between associative and dissociative relations amongst attributes pairs are used, one could extract hints pertaining to the organization of the production space of metropolitan areas. In the following two chapters these representative incidence matrices are considered as high order representations of the metropolitan production space and its dominant properties are studied through comparative landscape analyses.

CHAPTER III

INTRODUCTORY ANALYSES ON OVERALL REPRESENTATIONS;

3.1 An Overview on Areal Associations (Dissociations) of Areal Aggregates of Production Factors; a Prelude to Structural Relational Landscape Analysis

In this rather long section major properties of the industrial production space of Greater Istanbul are analyzed. As far as its quantitative aspects of industial distributions are concerned, the reader is referred to our exploratory study which convincingly illustrates the geographic and economic specificity of the problem. (Güvenç, 1992) But one can ask whether these results hold true for the qualitative structural properties as well? It is evident that if the latter question is answered positively then the analyst has to distinguish between,

a. distribution patterns observed on the geographicaly distinct components of the metropolitan area

b. and structural properties stemming from small and large scale establishments.

Provided that students have access to an appropriate data retrival and processing system and geographically coded industrial data, geographic and economic disaggration is not likely to pose any problem at all, however difficulties lie in the definition of an index capable to detect and assess differences in the spatial distribution patterns. As a prelude to this unconventional investigation we propose, to study this phenomenon through Gamma indices (Yule's Q) a powerful descriptive tool which unfortunately is not widely used in social scientific inquiry. It s powerful since it will enable us to assess both the strenght *and* the direction of the associative (repulsive) relation between attribute pairs.

We propose to use this index in pattern recognition. Patterns to be studied are presented in the second chapter. We will see that it provides us with signs with which we may generate a picture of associative and dissociative relations in the multidimensional metropolitan production space.

Its calculation and interpretation are rather straightforward. In fact, if in a 2 by 2 contingency table, frequencies on the major diagonal are shown by (a) and (d) and those on the minor diagonal as (b) and (c), the Gamma index is computed as follows;

Gamma= [(a).(d) - (b).(c)] / [(a).(d) + (b).(c)]

Thus, unlike Chi square or other indices based on Chi square (Phi), which detect whether there is *some sort of a deviation* without specifying whether its associative or dissociative, Gamma shows the direction of the relation. It is evident that if the cross product for concordant frequencies exceeds that of discordant frequencies the sign of the gamma index will be positive. The sign will be negative if the cross product of discordant frequencies is greater.

The sign of the relation is of crucial importance in landscape analysis. In fact students would like to know, above all, the kind of joint dstribution they are dealing with. It is extremely important to know whether two binary attributes behave in a concordant or discordant manner.

An areal distribution where two attributes either co-exist or are absent at the same time, (without any discordant pair; ie. frequencies on the minor diagonal are zero) is associative. In that case the index Gamma would assume a value of +1. If the inverse is true (ie. if the contingency table do not have any concordant case) these attributes can be considered as mutually repulsive and the relationship between them as dissociative. Such would be the case if we have studied the relationship between residences of presidents and nuclear power plants. Evidently, in this particular case Gamma is likely to assume a value of -1. Finally, if crossproducts for concordant and discordant frequencies are equal the index would assume a value of zero.

These properties make Gamma a useful index whose values could be easily interpreted. Notice however it has an inconvenience. In fact one could easily see that the index Gamma will assume a value of + 1 or -1 if one of the cell frequencies is equal to zero. However this particular case it did not pose a great problem.

It is evident that if we compute gamma indices for every possible pairs of attributes shown in Figures 2.1.a- 2.5.c the results can be shown in matrix form. In such matrices diagonal elements will always be equal to one since each attribute is perfectly associated with itself, and because of symmetry it will be sufficient to consider only half of the remaining entries. If industrial attributes are written as in Table 3.1 the distribution of Gamma indices can be grouped as follows:

Table 3.1 Format of the Matrix for Gamma indices used in our Analyses on Industrial landscapes

	N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re
N	1		N x L				N x S			N x C		
Adm		1										
W			1									
MW				1	L x L		L x S			L x C		
Tc					1							
En						1						
CA							1	S x S		S x C		
UA								1				
OF									1	C x C		
Rv										1		
Mc											1	
Re												1

in which:

N denotes the number of plants,
L covers at level N+1 different categories of industrial labor (defined at level N),
S covers (at level N+1) different industrial land use categories (defined at level N)
C covers (at level N+1) different categories of industrial capital(defined at level)

In this matrix of Gamma indices we can identify the following 9 zones with the following properties;

zone 1; (N x L): gamma indices will denote the strenght of the areal association between Number of Plants and different categories of Labor.

zone 2; (N x S) gamma indices will denote the strenght of the areal association between Number of Plants and different categories of Land Use.

zone 3; (N x C) gamma indices will denote the strenght of the areal association between Number of Plants and different categories of Capital.

zone 4; (L x L) gamma indices will denote the strenght of the areal association within different categories of Labor.

zone 5 (L x S) gamma indices will denote the strenght of the areal association between different categories of Labor and Land Use.

zone6 (L x C) gamma indices will denote the strenght of the areal association between different categories of Labor and Capital.

zone 7; (S x S) gamma indices will denote the strenght of the areal association within different Land Use Categories.

zone 8; (S x C) gamma indices will denote the strenght of the areal association between different Land Use Categories and Capital.

zone 9; (C x C) gamma indices will denote the strenght of the areal association between different Land Use Categories and Capital.

The first matrix of areal association (dissociation) (See Table 3.2). that we are going to interpret, relates to the total plant population. Here, different neighborhoods constitute the simplices defined by areal aggragates of major factors of industrial production. Because of symmetry, it will be sufficient to consider at most (12x12)-12 /2= 66 Gamma values each depicting the strenght of the areal association between each pair of (industrial) attributes. We do believe that as opposed to limited insights one could extract from Figures 2.1.a to 2.1.c depicting changes that take place in the combination of industrial attributes as a function of distance, through visual interpretation, these matrices yield hints pertaining to the organization of the industrial production space.

But before summarizing the results of this interpretative exercice it would be pertinent to lay stress on the following points;

1. Structural properties of industrial landscapes taken into account depend above all upon the type of industrial establishment which produces the neighborhood level aggregates of industrial production factors. Hence one could investigate the properties of the industrial production space generated by;

a. the total plant population (small + large plants)

b. small scale establishments

c. large scale establishments

Secondly, the total plant population is made by the sum of small and large plants. If we consider differences in factor endowments, analyses related to total plant population will reflect the dominant weight of large plants.

Thirdly, the superposition of layers generated by the distribution of small and large plants is likely to generate some noisy attributes and/or some pseudo simplices. It is rather easy to visualize this property of structural investigation.

Suppose that the slicing parameter for number of plants is set to 6. In this case a neighborhood will be considered important in terms of plant concentration *if and only if* 6 or more plants are located there. Suppose that it comprises 5 large and 2 small plants. It is evident that unless total plant population is considered, the attribute 'Number of Plants' will not appear as being important in this particular neighborhood. Hence we have to be extremely cautious while interpreting Gamma values derived from the distribution of total plant population.

Fourth, the result of this exercice will depend upon ;

a. values assigned to different entries in the vector of slicing parameters, which determine the scale or sensitivity of the exercice in quantitative terms
b. delimitation of the problem area in geographic terms

A modification of one of the above cited assumptions, can,

(a) affect the strenght of the areal association
(b) affect the direction of the association (dissociation)
(c) affect both the strenght *and*/or the direction of the areal association (dissociation)

Hence our results relate to one of the many possible ways of representing the production space. To emphasize this property, assumptions are explicitely stated.

Table 3.2 Values of Gamma Derived from the Distribution of Total Plant Population in *Greater Istanbul*

	N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re
N	1	,36	,41	,51	,37	,08	,03	-,20	,18	,36	,03	,03
Adm		1	,99	,94	,91	,84	,88	,73	,89	,97	,88	,83
W			1	,97	,91	,90	,92	,74	,92	,97	,92	,87
MW				1	,93	,86	,93	,70	,89	,90	,86	,84
Tc					1	,90	,87	,68	,92	,93	,88	,77
En						1	,86	,75	,97	,91	,95	,89
CA							1	,92	,95	,89	,90	,91
UA								1	,77	,75	,82	,80
OF									1	,91	,92	,92
Rv										1	,96	,93
Mc											1	,94
Re												1

Source: Computed from neighborhood simplices of Greater Istanbul defined in Figures 2.1.a to c

Note : The critical levels of slicing parameters are set by assuming an even distribution for each factor of production and employment category.

We present first, an overview on the production space of the metropolis generated by the total plant population. (Table 3.2) This analysis is of limited value as we do not have comparable observations to assess its specificity. It is presented, since it will be used as a 'measuring device' to evaluate the way industrial landscapes generated by small and large scale establishments deviate from this overall picture with known properties.

Table 3.2 suggests that the attribute Number of Plants is not strongly associated with other factors of industrial production. However entries in zones 1 to 3 present sufficient variation to illustrate the fact that latter attribute is more strongly associated with employment categories than it is with industrial capital. It is interesting to see that the lowest level of areal association is with engineers while a relatively high level of areal association is found for the pair N-MW.

Thus those neighborhoods that are important (unimportant) in terms of number of plants are likely to be important (unimportant) in terms of Master workmen. Notice however that the same does not hold true for the pair (Number of Plants- Engineers). And as opposed to those neighborhoods important in terms of (spatial) concentration of Engineers, those that are important in terms of Master Workmen are more likely to comprise the vertex Number of plants.

Machinery and Real Estate capitals are not strongly associated with Number of plants while the latter stands in a weak associative relation with Revolving and Other fixed capitals.

Relevant contingency tables suggest that when total plant population is taken into account, the number of neighborhoods important (un-important) in both attributes is approximately equal to the number of neighborhoods that are important in only one of them. Thus, at this level of enquiry, we do not have an evidence for a significant associative (dissociative) spatial relation. The same holds true for the relation between Number of Plants and Covered Area. Notice however that the relation between Number of Plants and Uncovered area, is dissociative.

Gamma indices among different employment categories (zone 5) depict strong associations. Though limited, there exists some variation. While the highest index is observed between Administrative Personnel and Workers, it is significantly lower for the pair Adm-En. This unexpected difference might, stem, from the ambiguity in the way admistrative personnel is defined.

Especially, in small plants, entrepreneurs tend to present themselves as directors or administrators. This also accounts for the unexpectedly high associative relation for the pair N-Adm observed in small plants category.

Gamma indices between employment and land-use categories shed light on yet another property of of the industrial landscape of

Greater Istanbul. Such is the case for Gamma indices between Covered area and different employment categories. These indices suggest that neighborhoods important in terms of Covered area likely to be to be important in terms of Master Workmen, and Workers as opposed to Engineers. Notice also that Engineers are more strongly associated with Uncovered Area than Master Workmen. We must however acknowledge that the variation in gamma values computed between employment categories and Uncovered area is rather limited.

Gamma values in zone 8 (indicating the strenght of the areal association among different categories of industrial capital and land use) are similar to those in zone 5. Hence, when the distribution of the total plant population within entire metropolitan area is taken up, different items of capital emerge as being more closely associated with the attribute Covered Area then they are with Uncovered Area. Notice also that Machinery capital is the most strongly associated with Uncovered area.

Zone 7 suggests that land-use categories present a strong associative relation between themselves.

Finally, Gamma indices in zone 9 show that the different items of industrial capital are in an associative relation among themselves.

These results, suggest that we deal with a rather complicated industrial landscape, in which, production factors are not only associated within themselves (see zones 4, 7 and 9), but are also strongly associated between themselves. (see; zones 5, 6 and 8) In fact, out of a total of 12 important attributes taken up, Number of Plants and Uncovered are the only ones depicting signs of areal differentiation. In other words we deal with a highly interconnected structure, with limited signs of areal differentiation. On the other hand, the difference amongst Gamma indices is so small that, one would question the legitimacy conclusions pertaining to variations in production factor deployment patterns.

We face therefore, a problem of interpretation which resembles to the one encountered in our exporatory study where spatial Lorenz curves derived for the total plant population presented *periodicities* which were very hard to interpret. (Güvenç, 1989, 1992) But here we have a similar problem of interpretation in qualitative terms. Moreover, one could immediately point out to the fact that certain gamma indices are rather noisy. Such for instance is the case for Gamma indices related to Real Estate Capital. If we recall that two thirds of the total plant population consists of tenants (Re=0), it becomes evident that the last column in Table cannot be considered as relevant measure of areal association between Real Estate capital and other attributes. Since those plants which are excluded from the relationship, are indirectly included in the calculation of the Gamma index.

It is, of course, preferable to study the areal association of Real Estate Capital with other areal attributes in those plants which are endowed or devoid of latter attribute in a non trivial way. Thus, Gamma indices associated with Real Estate capital are misleading.

Unfortunately, this, is not the only distortion. Referring to the sharp contrast between production structures of small and large plants we may question the relevance of other indices as well. A closer scrutiny on attributes taken into account would show that while a number of them are additive others are not.

There is evidently no problem in aggregating the number of small and large plants located within each neighborhood. Similarly different items of industrial capital could be added since they are measured in monetary terms. But problems arise when employment categories are aggregated, since they might relate to qualitatively different entities. This aggregation would be justified only if operatives can be considered as being qualitatively the same. We have already pointed out to difficultes stemming from the definition of the category Administrative Personnel which (because of a badly prepared questionnaire) tends to mix shop owners, with clerical employees in large plants.

We are going to see that this has serious consequences. For the two are distinct categories. But the issue that we raise has nothing to do with this trivially simple linguistic difficulty which could be very easily eliminated through a better questionnaire. It relates to tasks fulfilled by different types of plant operatives in small and large scale establishments. Although we observe operatives called Master Workmen in both small and large scale plants, we know that they do not, assume similar responsabilities or perform similar functions. In small plants Master workmen perform those critical tasks the success of which depend heavily on skill, as opposed to routine tasks of production processes carried out by apprentices or less qualified workers. The same, does not hold true in large scale capital intensive establishments where the success of the production does not depend on the skill of the operatives. Here, Master workmen (Foremen) are not engaged in production but act as a supervisor. The similar qualitative differences can be extended to other categories as well.

The use of the same label (word) for these two qualitatively distinct types of industrial labor does, of course not, imply that they could be aggregated under the same category. It is of course possible to avoid this type confusion through separate analyses of areal association for small and large scale plants.

This distinction pertaining to the definition of the economic individual (plants) has very important consequences, for, it changes our approach to general geographic analysis.

From now on, the general industrial landscape will not be considered as being shaped through neighborhood level deposits of industrial production factors from all types of industrial plants, but through the superposition of two layers each depicting distinct industrial geographies.

Thus, scale discrimination would enable us to reduce the number of pseudo-attributes and to come up with a better picture of areal associations.

Suppose that 2 small and 9 large plants are located in a given neighborhood and that the slicing parameter associated with Number of Plants is set to 10. When total plant population is taken into account this neighborhood will be represented as being important in terms of Number of Plants but will be devoid of this attribute if small and large plants are separately analyzed.

Thus, areal aggregation of industrial attributes may in certain cases be misleading. The above example suggests that it may also be harmful as it would generate pseudo-attributes even in those that are apparently additive. With the introduction of these pseudo-attributes, the whole, may depict features that are not present in its constituent parts. Such vertices are harmful as they reduce the variation in gamma values and generate a noisy account.

The following paragraph in which gamma indices for small and large plants are studied separately, shows that, in most cases, the introduction of such pseudo attributes distort gamma values and confine us to a very limited range of variation.

3.2 An Overview on The Strenght Of Areal Association of Production Factors and Labor In Small and Large Scale Plants Categories

To illustrate the harmful effects of areal aggregation, we start with an overview on industrial landscapes generated by the intra-metropolitan distribution of small and large scale plants. In this section, the two layers of the industrial landscape are analysed at the same scale through a vector of slicing parameters derived for the total plant population. This vector of slicing parameters enabled us to assess contributions emanating from these two distinct geographies and to account for the noise generated by areal aggregation.

Gamma indices computed for small and large plants categories are given in Table 3.3 together with those derived from the total plant population. Even a casual observer would notice the variation of Gamma values and suggest that our previous conclusions are completely misleading as they they tend to hide more than reveal, and that they cannot be taken at their face value. In other words, the non-negligeable variation in gamma values suggest that the inclusion of marginal deposits of production factors, generates, more often than not, non-marginal distortion effects.

On the other hand, Table 3.3 shows that the effect of areal aggregation of industrial attributes varies with the attribute pair taken into account. Thus, instead of providing a comprehensive list of all (dis)similarities and similarities it would be pertinent to categorize the effect of areal aggregation on the value of γ under three headings. One can immediately detect that in 7 out of a total of 60 meaningful entries gamma indices computed for the total plant population assume values that are noticeably *lower* than those computed for small and large plants. More specifically we have:

$(\gamma_G < \gamma_S)$ and

$(\gamma_G < \gamma_L)$

Table 3.3 also shows that this type of distortion occurs exclusively in Gamma indices between Number of Plants and the following attributes;

- Administrative Personnel
- Workers
- Master Workmen
- Engineers
- Covered Area
- and Real Estate Capital (though with some qualification)

In other words, in these pairs of attributes, areal aggregation of industrial attributes causes a decrease in the strenght of the areal association. The analysis of related contingency tables and Figures 2.1.a to 2.1.c suggests that this decrease stems from the inclusion of neighborhoods that are important in terms of plants only, located in and around the metropolitan center. Hence the decomposition of the total plant population into its constituent parts eliminates this noise and conveys a much better account of the situation on the ground.

On the other hand, the distribution of small plants generates a landscape, in which, the attribute Number of plants is positively associated with Covered area. In other words, in the layer related to small plants, the presence (absence) of Covered area is closely associated with the presence (absence) of plant concentration (and vice versa). The same holds true, though to a lesser extent, in the layer associated with large plants.

Notice also that the overall Gamma (γ_G) derived for the attribute pair [Number of plants-Closed area] fails to convey an adequate account of the strenght of association in neither small nor in large plants categories. Hence overall Gamma indices in this category hide much more than they reveal.

However the comparison of the values of γ produced in Table 3.3 suggests that the distortion effect generated by the areal aggregation takes place in the opposit direction as well. More specifically we have cases in which:

$(\gamma_G > \gamma_S)$ and

$(\gamma_G > \gamma_L)$

This type of distortion takes place in no less than 38 out of a total of 60 entries produced in Table 3.3. Because of the noise generated by areal aggregation, general Gamma indices tend to convey an amplified account of the strenght of the spatial association in both layers of the production space. This type of distortion has two awkward consequences.

Table 3.3 Comparison of Gamma Indices Derived from Incidence Matrices Generated by Small and Large Scale Plants

	Adm	W	MW	Tc	En	CA	UA	DF	Rv	Mc	Re
N	.36	.41	.51	.37	.08	.03	-.20	.18	.36	.03	.03 *
S**	.43	.82	.81	.33	.23	.70	-.46	.48	.17	.19	x
L	.64	.49	.81	.45	.37	.51	.05	.48	.57	.28	.70
Adm	1	.99	.94	.91	.84	.88	.73	.89	.97	.88	.83
S		.92	.91	.89	.87	.46	.26	.84	.40	.50	*
L		.72	.59	.69	.75	.85	.57	.78	.83	.82	.73
W		1	.97	.91	.90	.92	.74	.92	.97	.92	.87
S			.96	.96	.81	.53	.54	.81	.51	.95	*
L			.86	.87	.84	.85	.71	.78	.83	.88	.77
MW			1	.93	.86	.93	.70	.89	.90	.86	.84
S				.98	.83	.55	.48	.82	.52	.96	*
L				.68	.73	.80	.69	.46	.79	.75	.76
Tc				1	.90	.87	.68	.92	.93	.88	.77
S					.85	.53	.61	.81	.51	.95	*
L					.77	.78	.63	.75	.81	.84	.68
En					1	.86	.75	.97	.91	.95	.89
S						.95	.58	.75	.95	.96	*
L						.75	.76	.79	.78	.91	.80
CA						1	.92	.95	.99	.90	.91
S							.88	.99	.99	.99	*
L							.93	.83	.73	.79	.70
UA							1	.77	.75	.82	.80
S								.76	.78	.72	*
L								.66	.61	.71	.48
DF								1	.91	.92	.92
S									.98	.95	*
L									.89	.87	.79
Rv									1	.96	.93
S										.99	*
L										.90	.85
Mc										1	.94
S											*
L											.90
Re											1
S											*
L											1

Source: Computed from Area Coded Capacity Reports File of 1988

* Figures in *italic* relate to total plant population and to slicing parameters for total plants
** S : (Small plants; slicing parameters are specific to Total Plant Population and assume even distribution for each production factor).
L : (Large plants; slicing parameters are same as above)

First, in certain cases the overall index assumes values that are very close to one of the gammas but quite distant than the other. This type of distortion which totally misrepresents the strenght of the areal association in one of the layers will be referred to as Distortion Type (1). Such is for instance the case in gamma indices computed for the pair of attributes Administrative Personnel-Master Workmen. Here γ_G is equal to .94 and is very close to γ_L in large plants .91 . However it misrepresents the situation in small plants category where γ_S assumes a significantly lower .59 value.

Secondly, in certain cases the overall index misrepresents and distorts the strenght of the areal association in both layers. (Distortion Type 2). Gamma indices between Uncovered Area-Machinery capital depict such a distorsion. In fact, γ_G conveys a significantly amplified picture of areal association, notice that γ_S =.72, and γ_G = .71 and are significantly less than γ_G. (γ_G = .82)

Finally in the remaining 15 entries of Table 3.3, γ_G assumes values that are within the interval [γ_S, γ_L]. Even if this condition is satisfied we see that there exists a high variation and that Distortion Type 1 are frequent.

This simple example illustrates the fact that overall indices convey, more often than not, a distorted picture of the situation 'on the ground'. In certain pairs γ_G conveys a weakened account of the strenght of areal association, while strenghtening the latter in other pairs.

Thus, signals generated by overall indices happen to be rather noisy. This has led us to propose an alternative approach for the analysis of industrial landscapes in which we consider overall features as being misleding surface appearances generated by the superposition of two distinct layers. Hence, so as to produce a better picture pertaining to the strenght of the areal association in industrial attributes one has to conduct separate analyses in each one of the two layers of the production space.

We must therefore, ask ourselves, whether further noise reduction is possible or not? Can we possibly consider the two layers, industrial geographic features of which are shown in Table 3.3 as being adequate, and relevant descriptive accounts of these two distinct industrial geographies or not ?

This question deserves a negative answer. Simply because this exercice attempts basically to show the way these two layers contribute to the formation of the general industrial landscape. To this end, we have used a vector of slicing parameters derived for the total plant population in both layers. Obviously, so as to describe the industrial geographic characteristics of each layer we need to use group specific slicing parameter vectors.

3.3. An Overview on Specific Properties of Industrial Landscapes Generated by the intra-Metropolitan Distribution of Small and Large Scale Plants

This paragraph attempts to assess the sensitivity of previous Gamma indice to changes in slicing parameters. A comparison of gamma values in Tables 3.4 and 3.5 suggests that the two layers, show -as it might be expected- different responses to changes in the values of slicing parameters. Table 2.3 shows that in large plants, the implementation of group specific slicing parameters leads to increases in threshold levels (except in the attribute number of plants) while the opposite is true in small plants category.

It is, however, not easy to predict the effect of these changes on Gamma indices. Hence if we want to avoid hasty conclusions, we must concentrate on these changes.

One sees that in large plants category, the introduction of more severe threshold levels lead to increases in most Gamma indices. Following ones however do not behave in this way,; (Adm-Ca), (W-Ca), (CA -UA), (Rv -Re) which depict marginal decreases. When it comes to gamma indices associated to the attribute 'Number of Plants', the introduction of a lower threshold level (for N), associated with high levels for other attributes leads to noticeable decreases in all gamma indices.

Table 3.4 Strenght of the Areal Association in the Layer Relative to Large Plants Category According to Different Slicing Parameter Vectors.

	N	Adm	W	MW	Tc	En	CA	VA	OF	Rv	Mc	Re	
N	1 / 1	,64 / ,29	,49 / ,33	,81 / ,39	,45 / ,11	,37 / -,02	,51 / ,27	,05 / -,05	,48 / ,15	,57 / ,07	,28 / ,02	,70 / ,29	(**) / (***)
Adm		1 / 1	,72 / ,97	,59 / ,88	,69 / ,82	,75 / ,88	,83 / ,79	,57 / ,77	,78 / ,92	,83 / ,88	,82 / ,91	,73 / ,88	
W			1 / 1	,86 / ,93	,83 / ,87	,84 / ,93	,85 / ,81	,71 / ,73	,78 / ,88	,83 / ,89	,88 / ,91	,77 / ,93	
MW				1 / 1	,68 / ,81	,73 / ,82	,80 / ,84	,69 / ,69	,46 / ,83	,79 / ,73	,75 / ,77	,76 / ,82	
Tc					1 / 1	,77 / ,87	,78 / ,81	,63 / ,69	,75 / ,81	,81 / ,82	,84 / ,83	,68 / ,82	
En						1 / 1	,75 / ,78	,76 / ,79	,79 / ,86	,78 / ,82	,91 / ,93	,80 / ,88	
CA							1 / 1	,93 / ,89	,83 / ,85	,73 / ,76	,79 / ,85	,70 / ,73	
VA								1 / 1	,66 / ,70	,61 / ,63	,71 / ,78	,48 / ,76	
OF									1 / 1	,89 / ,91	,87 / ,93	,79 / ,91	
Rv										1 / 1	,90 / ,94	,85 / ,84	
Mc											1 / 1	,90 / ,91	

Source: Data Base is Derived from the Q-Analysis of Area Coded Capacity Reports File 1988

(*) In these cases the Gamma index assumes a value of 1 while one of the discordant cells is not assume zero, to avoid confusion it has been replaced by the index Phi

(**) Values of Gamma associated with the vector of slicing parameters derived for the total plant population

(***) Values of Gamma associated with the vector of slicing parameters specific to large plants

Table 3.5 Strenght of the Areal Association among Production Factors in Small Scale Plants Category According to Different Slicing Parameter Vectors.

	N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re ****	
N	1	.43	.82	.81	.33*	.23	.70*	-.46	.48	.17*	.19*		(**)
	1	.83	.88	.73	.70	.51	.71	.27	.51	.58	.65		(***)
Adm		1	.92	.91	.89	.87	.46	.26	.84	.40*	.50*		
		1	.92	.81	.89	.77	.82	.31	.81	.77	.76		
W			1	.96	.96	.81	.53	.54	.81	.51*	.95		
			1	.85	.85	.71	.79	.42	.73	.78	.87		
MW				1	.98	.83	.55*	.48	.82	.52	.96		
				1	.82	.55	.86	.36	.59	.78	.71		
Tc					1	.85	.53*	.61	.81	.51	.95		
					1	.88	.88	.45	.76	.77	.82		
En						1	.95	.58	.75	.95	.96		
						1	.76	.48	.64	.65	.69		
CA							1	.88	.99	.99	.99		
							1	.72	.73	.81	.85		
UA								1	.76	.78	.72		
								1	.41	.39	.58		
OF									1	.98	.95		
									1	.73	.68		
Rv										1	.99		
										1	.80		
Re												****	

Source: Data Base is Derived from the Q-Analysis of Area Coded Capacity Reports File of 1988

(*) In these cases the Gamma index assumes a value of 1 while one of the discordant cell frequencies is not equal to to avoid confusion it has been replaced by the index Phi

(**) Values of Gamma associated with the vector of slicing parameters derived from the distribution of total plant population

(***) Values of Gamma associated with the vector of slicing parameters spcific to small plants

(****) As Real estate Capital is used as discriminatory variable in group identification Gamma indices associated with latter attribute are not computed.

It is however much more difficult to categorize the consequences of using group specific treshold values in small plants category where we have mixed responses. (Table 3.5) Recall that in small plants category the use of group specific slicing parameter vectors causes significant reductions in threshold levels. (See Table 2.3) The obvious consequence of using lower threshold levels is that it increases the number of attributes taken into account. However the impact of this increase on Gamma indices is far from being unidirectional.

In fact, while in some 37 entries noticeable decreases are observed, no less than 20 show significant increases. Notice also that in only three cases the modification of the slicing parameters generates no significant effects in gamma indices.

Obviously these changes stem from the elimination of marginal attributes in large plants category and from the introduction of a number of new attributes in small plants category. Hence the use of slicing parameters derived from the distribution of the total plant population creates a smoke screen and it can mislead our analyses. Thus, the use of group specific slicing parameters arises as a first step to take if we want to avoid the noise that stems from the overall treshold levels.

Gamma indices in each one of these two layers are shown in Table 3.6. Also shown on the same matrix, are Gamma indices derived from the distribution of total plant population. The comparison of

Table 3.6 Greater Istanbul; Comparison of *Gamma* Indices Derived from Incidence Matrices Generated by Small and Large Plants

	N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re
N	1	*.36*	*.41*	*.51*	*.37*	*.08*	*.03*	*-.20*	*.18*	*.36*	*.03*	*.03* *
S**		.83	.88	.73	.70	.51	.71	.27	.51	.58	.65	.65
L		.29	.33	.39	.11	-.02	.27	-.05	.15	.07	.02	.29
Adm		*1*	*.99*	*.94*	*.91*	*.84*	*.88*	*.73*	*.89*	*.97*	*.88*	*.83*
S			.92	.81	.89	.77	.82	.31	.81	.77	.76	*
L			.97	.88	.82	.88	.79	.77	.92	.88	.91	.88
W			*1*	*.97*	*.91*	*.90*	*.92*	*.74*	*.92*	*.97*	*.92*	*.87*
S				.85	.85	.71	.79	.42	.73	.78	.87	*
L				.93	.87	.93	.81	.73	.88	.89	.91	.93
MW				*1*	*.93*	*.86*	*.93*	*.70*	*.89*	*.90*	*.86*	*.84*
S					.82	.55	.86	.36	.59	.78	.71	*
L					.81	.82	.84	.69	.83	.73	.77	.82
Tc					*1*	*.90*	*.87*	*.68*	*.92*	*.93*	*.88*	*.77*
S						.88	.88	.45	.76	.77	.82	*
L						.87	.81	.69	.81	.82	.83	.82
En						*1*	*.86*	*.75*	*.97*	*.91*	*.95*	*.89*
S							.76	.48	.64	.65	.69	*
L							.78	.79	.86	.82	.93	.88
CA							*1*	*.92*	*.95*	*.89*	*.90*	*.91*
S								.72	.73	.81	.85	*
L								.89	.85	.76	.85	.73
UA								*1*	*.77*	*.75*	*.82*	*.80*
S									.41	.39	.58	*
L									.70	.63	.78	.76
OF									*1*	*.91*	*.92*	*.92*
S										.73	.68	*
L										.91	.93	.91
Rv										*1*	*.96*	*.93*
S											.80	*
L											.94	.84
Mc											*1*	*.94*
S												*
L												.91
Re												*1*
S												*
L												

Source; Computed from Area Coded Capacity Reports Files of 1988

* Entries in *italic* relate to total plant population and to slicing parameters for total plant population

** S ; (Small plants) L;(Large plants); In both groups slicing parameters are category specific.

Tables 3.3 and 3.6 suggests that in many cases the use of group specific slicing parameters modifies the whole picture.

Consequently our previous results, conclusions and interpretations necessitate qualifications. Take for instance the case of the areal association between Uncovered Area and Machinery capital. Table 3.3 suggests that the two layers depict no significant differences as far as the strenght of this particular areal association is concerned. However, the specificity of each layer becomes visible subsequent to the introduction of group specific slicing parameters. (See Table 3.6).

Thus, if we consider the general industrial geographic features of greater Istanbul as being generated by the superposition of these two distinct layers, it will be much more pertinent to analyse these layers through group specific slicing parameters.

This result emphasizing the necessity of separate analyses in small and large plans category is totally consistent with the methodological conclusions of our exploratory quantitative investigation of the same landscape. (Güvenç, 1992)

But, although it is interesting and encouraging to find that a methodological hint derived from quantitative analyses holds true for qualitative investigations, the similarity is not far reaching. For, while in our quantitative survey large plants were found to exhibit - [as compared to small plants] a higher level of areal differentiation, the opposite is true in our qualitative study.

Notice that at this scale of analysis Gamma indices of small plants, exhibit a higher differentiation. (Table 3.6)

We start to see that at this scale of analysis, Gama indices associated 'Number of Plants' are significantly higher in small plants category than their counterparts in large plants category. Thus, as far as small plants are concerned the presence (absence) of the attribute Number of plants tends to be more closely (strongly) associated with the presence (absence) of other production factors and vice versa. However there exists a non-negligeable within group variation. Gamma indices between 'Number of Plants' and different employment categories suggest that the former is more strongly associated with Workers and 'Administrative Personnel' than the attribute Engineers. Gamma indices computed for the pairs N-MW and N-Tc show intermediate levels of areal association.

As expected, Number of Plants and Covered Area are strongly associated while the same is not true for the pair N-Uncovered Area. Finally, in small plants category, different items of industrial capital are fairly associated with the attribute Number of Plants. One also sees that in no less than 41 entries of Table 3.6, Gamma indices in large plants category are greater than those observed in small plants. But, these results relate to the entire metropolitan area, so, before concentrating on differences and similarities it will be pertinent to discuss the geographic representativity and relevance of a matrix of areal association indices shown in Table 3.6

This could be achieved through geographic disaggregation. It is evident that entries in a matrix of areal correlation coefficients can be taken up as pertinent accounts of the situation if they do *not* exhibit noticeable spatial variation. Otherwise it becomes hardly possible to consider γ_G's produced in Table 3.6 as being geographically relevant. The following discusion suggests that the latter happens to be the case in most of the measures of areal association. To illustrate the impact of this additional source of distortion (geographical aggregation) let us go back to our initial table and measure the distortion effect it comprises.

The geographically disaggregated Gamma indices derived from the distributon of total plant population shown in Table 3.7 suggest that γ_G fail more often than not to convey a geographically acceptable account in at least one of the three sides of the metropolitan area. In certain cases γ_G happens to misrepresent not only one but two of the three sides of the metropolitan area. Although indices showing stability are rather exceptional.

Furthermore, the spatial variation in Gamma indices computed for small and large scale plants produced in Tables 3.8 and 3.9 suggest that industrial landscape analysis in greater Istanbul necessitates a geographically disaggregated approach. Methodologically speaking this result is important since it clearly indicates that neither economic nor spatial disaggregation alone

Table 3.7 Spatial Variation in the Strenght of Areal Association Among Different Production Factors
(I: Istanbul Side, B: Beyoglu Side, A: Anatolian Side)

	N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re
N	1	,36	,41	,51	,37	,08	,03	(,09)	,18	(,17)	,03	,03
I		,26	,31	,28	,54	-,10	,14	(,07)	,14	(,13)	,03	-,27
B		,45	,54	,40	,40	,45	,65	(,16)	,52	(,29)	,02	,57
A		,70	,70	,85	,50	,54	,29	(,19)	,50	(,24)	,31	,59
Adm		1	(1,00)	,94	,91	,84	(,60)	(,40)	,89	(,64)	,88	,83
I			(,84)	,93	,92	,86	(,57)	(,37)	,90	(,62)	,96	,83
B			,91	,93	,97	,83	,94	(,40)	,95	(,73)	,73	,89
A			1,00	,96	,84	,85	(,62)	(,52)	,88	(,58)	,90	,47
W			1	,97	,91	,90	,92	(,43)	,92	(,66)	,92	,87
I				,97	,94	,92	,94	(,43)	,94	(,69)	,96	,90
B				,98	,94	,91	,96	(,36)	,93	(,66)	,85	,94
A				,95	,84	,85	(,62)	,88	,88	(,58)	,90	,77
MW				1	,93	,86	,93	(,39)	,89	,90	,86	,84
I					,95	,91	,96	(,42)	,94	,93	,88	,85
B					,95	,78	,98	(,42)	,89	,96	,85	,91
A					,87	,80	,74	(,28)	,79	,76	,82	,73
Tc					1	,90	,87	(,38)	,92	(,60)	,88	,77
I						,88	,93	(,40)	,87	(,67)	,98	,93
B						,93	,95	(,42)	1,00	(,76)	,77	,91
A						,89	,47	(,22)	,90	(,38)	,86	,45
En						1	,86	(,43)	(,67)	,91	,95	,89
I							,94	(,49)	(,72)	,94	,98	,93
B							,87	(,40)	(,72)	,95	,90	,96
A							,55	(,27)	(,53)	,80	,93	,69
CA							1	(,59)	,95	,89	,90	,91
I								(,52)	,97	,90	,92	,91
B								(,46)	,92	,97	,92	,98
A								(,60)	,90	,80	,91	,71
UA								1	(,47)	(,44)	(,52)	(,49)
I									(,50)	(,52)	(,69)	(,52)
B									(,55)	(,55)	(,44)	(,52)
A									(,28)	(,37)	(,30)	(,35)
OF									1	,91	,92	,92
I										,93	,94	,98
B										,97	,91	,96
A										,84	,88	,75
Rv										1	,96	,93
I											,97	,92
B											,95	,99
A											,96	,87
Mc											1	(,70)
I												(,71)
B												(,85)
A												(,55)
Re												1
I												1
B												1
A												1

Source: Computed from Neighborhood Simplices derived from the Q-Analysis of Area Code Assigned Capacity Reports
(Entries in paranthesis show the values of Phi, other entries are Gamma indices)

Table 3.8 Spatial Variation in the Strenght of Areal Association Among Different Attributes in *Small Plants* Category (I: Istanbul Side, B: Beyoglu Side, A: Anatolian Side)

	N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re
N	1	,83	,88	,73	,70	,51	,71	(,12)	,51	,58	,65	*
I		,76	,90	,74	,67	,57	,59	(,20)	,36	,66	,61	*
B		,66	,77	,50	,64	,30	,74	(,34)	,75	,35	,77	*
A		,98	,92	,86	,87	,69	,93	(,06)	,57	,57	,65	*
Adm		1	,92	,81	,89	,77	,82	(,15)	,81	,77	,76	*
I			,95	,81	,84	,71	,73	(,15)	,68	,84	,80	*
B			,88	,78	,97	,78	,85	(,34)	,58	,68	,77	*
A			,85	,80	,93	,89	,93	(,19)	,90	,71	,70	*
W			1	,85	,85	,71	,79	(,21)	,73	,78	,87	*
I				,93	,88	,80	,90	(,29)	,77	,94	,93	*
B				,77	,79	,77	,53	(,46)	,90	,66	,89	*
A				,58	,85	,48	,72	(,01)	,27	,27	,58	*
MW				1	,82	,55	,86	(,18)	,59	,78	,71	*
I					,89	,60	,89	(,27)	,64	,80	,72	*
B					,86	,50	,85	(,34)	,89	,89	,95	*
A					,59	,51	,84	(,05)	,13	,51	,34	*
Tc					1	,88	,88	(,22)	(,44)	,77	,82	*
I						,87	,89	(,22)	(,43)	,84	,90	*
B						,86	,85	(,40)	(,68)	,59	,79	*
A						,93	,89	(,18)	(,26)	,82	,59	*
En						1	,76	(,25)	(,36)	,65	,69	*
I							,88	(,35)	(,38)	,76	,78	*
B							,41	(,34)	(,58)	,35	,64	*
A							,76	(,14)	(,19)	,58	,65	*
CA							1	(,41)	,73	,81	,85	*
I								(,47)	,72	,83	,85	*
B								(,49)	,75	,83	,92	*
A								(,32)	,79	,79	,75	*
UA								1	(,21)	(,19)	(,30)	*
I									(,18)	(,26)	(,32)	*
B									(,59)	(,44)	(,46)	*
A									(,06)	(,06)	(,23)	*
OF									1	,73	,68	*
I										,78	,72	*
B										,78	,82	*
A										,68	,33	*
Rv										1	,80	*
I											,84	*
B											,92	*
A											,51	*
Mc											1	*
I												*
B												*
A												*
Re												*

Source: Computed from Simplices derived from the Q-Analysis of Area Code Assigned Capacity Reports; slicing parameters (group specific)

Note: The first (detached) row shows Gamma indices for the entire area. Entries in paranthesis show the values of *Phi*, others are *Gamma* indices.

Table 3.9 Spatial Variation in the Strenght of Areal Association Among Different Attributes in *Large Plants* Category (I: Istanbul Side, B: Beyoglu Side, A: Anatolian Side)

	N	Adm	W	MW	Tc	En	CA	UA	DF	Rv	Mc	Re
N	1	,29	,33	,39	,11	-,02	(,13)	(,02)	,15	,07	,02	,29
I		,05	,34	,33	,32	-,15	(,05)	(,15)	,45	,18	,04	,06
B		,54	,58	,91	,38	,23	(,77)	(,40)	,83	,58	,58	,87
A		,40	,21	,13	-,13	,11	(,00)	(,01)	-,44	-,36	-,25	,21
Adm		1	,97	,88	,82	,88	,79	(,44)	(,59)	,88	,91	(,59)
I			,96	,87	,82	,95	,91	(,45)	(,72)	,96	,98	(,67)
B			,94	,73	,67	,77	,73	(,40)	(,64)	,80	,80	(,70)
A			,99	,95	,89	,86	,74	(,50)	(,41)	,77	,83	(,46)
W			1	,93	,87	,93	,81	(,42)	,88	,89	,91	,93
I				,96	,83	,94	,89	(,33)	,91	,92	,92	,96
B				,68	,72	,94	,68	(,48)	,90	,91	,91	,93
A				,96	,96	,94	,83	(,53)	,83	,88	,91	,86
MW				1	,81	,82	,84	(,39)	,83	,73	,77	,82
I					,76	,80	,87	(,26)	,87	,76	,76	,85
B					,59	,51	,84	(,52)	,93	,86	,86	,96
A					,89	,91	,74	(,50)	,73	,66	,76	,68
Tc					1	,87	,81	(,39)	(,48)	,82	,83	,82
I						,85	,91	(,37)	(,46)	,94	,91	,88
B						,67	,87	(,37)	(,59)	,73	,45	,83
A						,93	,70	(,46)	(,48)	,69	,84	,81
En						1	,78	(,48)	,86	,82	,93	(,59)
I							,89	(,51)	,89	,89	,97	(,74)
B							,73	(,40)	,83	,94	,80	(,70)
A							,67	(,50)	,84	,72	,92	(,39)
CA							1	(,54)	,85	,76	,85	,73
I								(,55)	,90	,91	,91	,85
B								(,52)	,93	,86	,86	,96
A								(,45)	,71	,57	,88	,23
UA								1	(,40)	(,35)	(,47)	,76
I									(,34)	(,37)	(,55)	,70
B									(,63)	(,48)	(,48)	,57
A									(,41)	(,41)	(,44)	,76
DF									1	,91	,93	,91
I										,92	,88	,98
B										,90	,90	,96
A										,95	,98	,76
Rv										1	,94	,84
I											,96	,92
B											,96	,91
A											,94	,69
Mc											1	,91
I												,95
B												,93
A												,85
Re												1

Source: Computed from Neighborhood Simplices derived from the Q-Analysis of Area Code Coded Capacity Reports with group specific slicing parameters

Note: The first detached row shows the overall Gamma index. Entries in paranthesis are the values of *Phi*, others are *Gamma* indices.

yield a satisfactory account of the landscape. In other words, spatial stability of Gamma emerges as being an exception rather than a rule. Hence the relevance and the degree of representativity of most of them are not unlike those averages computed in skewed distributions. Thus, because of the distortion effect stemming from the aggregation of attribute deposits from plants in different size categories and the noise effect generated by the inclusion of neighborhoods of marginal importance, signals from γ_G's can hardly be generalized. In other words γ_G is representative of the degree of areal association *at most*, in one or two side(s) of the metropolitan area.

In other words, we run the risk of confusing properties observed in one of the geographical components with those of the whole. This type of a confounding error is certainly not acceptable in landscape analyses where the emphasis is on areal differentiation. As it is easy to find many examples of this type of confounding error, it would be convenient not to elaborate on this issue any further. Thus in addition to distortion effect stemming from the aggregation of production factors from small and large scale establishments, γ_G's produced in Table 3.2 are not relevant in geographic terms. In brief, we have to qualify our previous conceptualization of the general industrial landscape as being made of the superposition of two layers with distinct industrial geographic characteristics. Industrial geographic properties of these two layers are not homogeneously distributed but depict spatial variation.

Overall indices of spatial association show, therefore, only a weighted average of these properties Thus, they have to be unpacked. The implication of this result is that, for a geographically and economically relevant account of the industrial landscape of greater Istanbul, we need separate studies carried out in each side of the metropolitan área in which contributions from small and large scale plants are explicitly stated. The following discussion attempts to accomplish this task and to prepare the ground for structural landscape analyses.

3.4 A Final Assessment on the Reliability of Indices of Areal Association

We have seen that the strenght of the areal correlation coefficients are highly sensitive to the decomposition of the total plant population according to different size categories, to geographic disaggregation, and that, -in themselves- both types of disaggregation yield noticeable degrees of noise reduction. It is evident that one could achieve a higher level of noise reduction and representativity if these two types of disaggregation are jointly carried out.

As a direct consequence of this methodological hint (which is perfectly consistent with the results of our quantitative studies, (Güvenç, (1989, 1992)) industrial geographies of small and large scale establishments are studied on a geographically disaggregated basis. The strenght of the areal association amongst different production factors in each geographical component of the metropolitan area are produced in Tables 3.10 to 3.12. This decomposition illustrates the contrasts between small and large plants and the specific industrial geographic character of the three sides of the metropolitan area.

But, as we have no less than 198 Gamma indices in each matrix and that the effect of geographic and economic aggregation changes according to the pair of attributes taken into account, a comprehensive analysis discussing the impact on each and every entry is likely to be awkwardly long. So we propose the following procedure, which enables us to read directly the specific industrial geographic character of each one of the three components.

In each geographical component of the metropolitan area the comparison of gamma indices drived for the total plant population, and small and large plants yield the following categories.

In a large number of entries we see that overall gamma index is greater than gamma indices derived for small and large plants categories. In other words,

$\gamma_G > \gamma_L$ and

$\gamma_G > \gamma_S$

In these cases γ_G tend to overemphasize the real strength of the areal association. Such cases are shown in Table 3.13 in each geographical component of the metropolitan area. Notice that in some 90 entries (out of a total of 198 non trivial entries) summarized in

Table 3.10 Comparison of Gamma and Phi Indices Derived from Small and Large Scale Plants Located on the Istanbul Side with those Derived for the Total Plant Population

	N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re
N	1	,26	,31	,28	,54	-,10	(,07)	(,07)	,14	(,13)	,03	-,27
S		,76	,90	,74	,67	,57	(,31)	(,20)	,36	,66	,61	*
L		,05	,34	,33	,32	-,15	(,05)	(,15)	,45	(,08)	,04	,06
Adm		1	,84	,93	,92	,86	(,57)	(,37)	(,50)	(,62)	,96	(,51)
S			,95	,81	,84	,71	(,42)	(,15)	(,39)	(,48)	,80	*
L			,96	,87	,82	,95	(,64)	(,45)	(,72)	(,69)	,98	(,67)
W			1	,97	,94	,92	,94	(,43)	,94	(,69)	,96	,90
S				,93	,88	,80	,90	(,29)	,77	,94	,93	*
L				,96	,83	,94	,89	(,33)	,91	,92	,92	,96
MW				1	,95	,91	,96	(,42)	,94	,93	,88	,85
S					,89	,60	,89	(,27)	,64	,80	,72	*
L					,76	,80	,87	(,26)	,87	,76	,76	,85
Tc					1	,88	,93	(,40)	(,54)	(,67)	,98	,93
S						,87	,89	(,22)	(,43)	(,50)	,90	*
L						,85	,91	(,37)	(,46)	(,70)	,91	,88
En						1	,94	(,49)	(,72)	,94	,98	(,67)
S							,88	(,35)	(,38)	,76	,78	*
L							,89	(,51)	,89	,89	,97	(,74)
CA							1	(,59)	,95	,89	,90	,91
S								(,47)	,72	,83	,85	*
L								(,55)	,90	,91	,91	,85
UA								1	(,50)	(,52)	(,69)	(,52)
S									(,18)	(,26)	(,32)	*
L									(,34)	(,37)	(,55)	(,39)
OF									1	,91	,92	,92
S										,78	,72	*
L										,92	,88	,98
Rv										1	,96	,93
S											,84	*
L											,96	,92
Mc											1	(,70)
S												*
L												(,71)
Re												1
S												*
L												1

Source : Computed from neighborhood level deposits of industrial attributes derived by means of the CCIS system (see Güvenç, (1989))

Key ; S : Small Plants (Group Specific Slicing Parameters)
L : Large Plants (Group Specific Slicing Parameters)
* : Not Computed as small plants are defined as those establishments devoid of real estate capital

Note Detached rows show Gamma indices computed for the total plant population. Entries in paranthesis show the value of the Phi and those without paranthesis Gamma indices.

Table 3.11 Comparison of Gamma and Phi Indices Derived from Small and Large Scale Plants Located on the Beyoğlu Side with those Derived for the Total Plant Population

	N	Adm	W	MW	Tc	En	CA	UA	DF	Rv	Mc	Re
N	1	,45	,54	,40	,40	,45	(,23)	(,16)	,52	(,29)	,02	,57
S		,66	,77	,50	,64	,30	(,40)	(,34)	,75	,35	,77	*
L		,54	,58	,91	,38	,23	(,77)	(,40)	,83	,58	,58	,87
Adm		1	,91	,93	,97	,83	,94	(,40)	(,62)	(,73)	,73	(,56)
S			,88	,78	,97	,78	,85	(,34)	(,58)	(,37)	,77	*
L			,94	,73	,67	,77	,73	(,40)	(,64)	(,49)	,80	(,70)
W			1	,98	,94	,91	(,69)	(,36)	,93	(,66)	,85	,94
S				,77	,79	,77	(,29)	(,46)	,90	,66	,89	*
L				,87	,73	,98	(,52)	(,48)	,93	,86	,86	,96
MW				1	,95	,78	,98	(,42)	,89	,96	,85	,91
S					,86	,50	,85	(,34)	,89	,89	,95	*
L					,87	,73	,98	(,52)	,93	,86	,86	,96
Tc					1	,93	,95	(,42)	(,76)	(,76)	,77	,91
S						,86	,85	(,40)	(,68)	(,32)	,79	*
L						,67	,87	(,37)	(,59)	(,41)	,45	,83
En						1	,87	(,40)	(,72)	,95	,90	(,67)
S							,41	(,34)	(,58)	,35	,64	*
L							,73	(,40)	(,46)	,94	,80	(,70)
CA							1	(,46)	,92	,97	,92	,98
S								(,49)	,75	,83	,92	*
L								(,63)	,93	,86	,86	,96
UA								1	(,55)	(,55)	(,44)	(,52)
S									(,59)	(,44)	(,46)	*
L									(,63)	(,48)	(,48)	(,57)
DF									1	,97	,91	,96
S										,78	,82	*
L										,90	,90	,96
Rv										1	,95	,99
S											,92	*
L											,96	,91
Mc											1	,85
S												*
L												,93
Re												1
S												*
L												1

Source : Computed from neighborhood level deposits of industrial attributes derived by means of the CCIS system (see Güvenç, (1989))

Key ; S : Small Plants (Group Specific Slicing Parameters)
L : Large Plants (Group Specific Slicing Parameters)
* : Not Computed as small plants are defined as those establishments devoid of real estate capital

Note Detached rows show Gamma indices computed for the total plant population. Entries in paranthesis show the value of the Phi and those without paranthesis Gamma indices.

Table 3.12 Comparison of Gamma and Phi Indices Derived from Small and Large Scale Plants Located on the Anatolian Side with those Derived for the Total Plant Population

	N	Adm	W	MW	Tc	En	CA	UA	DF	Rv	Mc	Re
N	1	,70	,70	,85	,50	,54	,29	,43	,50	,47	,31	,59
S		,98	,92	,86	,87	,69	,93	,13	,57	,57	,65	*
L		,40	,21	,13	-,13	,11	,00	-,02	-,44	-,36	-,25	,21
Adm		1	1,00	,96	,84	,85	(,62)	,88	,88	,94	,90	,47
S			,85	,80	,93	,89	(,68)	,37	,90	,71	,70	*
L			,99	,95	,89	,86	(,37)	,80	,73	,77	,83	,76
W			1	,95	,84	,85	(,62)	,88	,88	,94	,90	,77
S				,58	,85	,48	(,40)	,03	,27	,27	,58	*
L				,96	,96	,94	(,43)	,83	,83	,88	,91	,86
MW				1	,87	,80	,74	(,28)	,79	,76	,82	,73
S					,59	,51	,84	(,05)	,13	,51	,34	*
L					,89	,91	,74	(,50)	,73	,66	,76	,68
Tc					1	,89	,47	,47	,90	,73	,86	,45
S						,93	,89	,35	,53	,82	,59	*
L						,93	,70	,77	,82	,69	,84	,81
En						1	,55	,56	,86	,80	,93	,69
S							,76	,27	,40	,58	,65	*
L							,67	,80	,84	,72	,92	,68
CA							1	,91	,90	,80	,91	,71
S								,59	,79	,79	,75	*
L								,85	,71	,57	,88	,23
UA								1	,58	,84	,61	,67
S									,14	,14	,44	*
L									,73	,77	,76	,76
DF									1	,84	,88	,75
S										,68	,33	*
L										,95	,98	,76
Rv										1	,96	,87
S											,51	*
L											,94	,69
Mc											1	,85
S												*
L												,85
Re												1
S												*
L												1

Source : Computed from neighborhood level deposits of industrial attributes derived by means of the CCIS system (see Güvenç, (1989))

Key ; S : Small Plants (Group Specific Slicing Parameters)
L : Large Plants (Group Specific Slicing Parameters)
* : Not Computed as small plants are defined as those establishments devoid of real estate capital

Note Detached rows show Gamma indices computed for the total plant population. Entries in paranthesis show the value of the Phi and those without paranthesis Gamma indices.

Tables 3.10 to 3.12 this distortion occurs. It would therefore be convenient to concentrate on it. An overview on Tables 3.10 to 3.12 suggests that in some cases this distortion effect is formidable. Obviously in these cases the overall index does not have any contribution what so ever to our understanding of the observed areal association of production factors on the ground. If we adopt a tolerance limit of .10 we see that the number of such cases is low and concerns some 23 pairs of areal attributes shown in Table 042. It is evident that in those cases it would be preferable not to use the overall index of areal association.

Table 3.13 Attribute Pairs in which the Overall Index Tend to Overestimate the Strenght of the Areal association

Attribute Pairs	Istanbul Side	Beyoglu Side	Anatolian Side
N -	(None)	(En*,)	(UA*)
Adm -	(MW, Tc,)	(MW*, En, CA, Rv*)	(W, MW, UA, Rv*, Mc)
W -	(MW, Tc, CA, UA, OF, Mc)	(MW*, Tc*, CA*)	(CA*, UA, OF, Rv,
MW -	(Tc, En*, CA, UA*, OF, Rv*, Mc*)	(Tc, En, Rv)	(OF, Rv, Mc, Re)
Tc -	(En, CA, UA, OF, Mc, Re)	(En, CA, UA, OF, Rv*, Re)	(OF, Mc,)
En -	(UA, CA, Rv, Mc,)	(CA*, OF*, Rv, Mc,)	(OF, Rv, Mc, Re)
CA -	(UA, OF, Re)	(Rv*, Re)	(UA, OF*, Rv, Mc, Re)
UA -	(OF*, Rv*, Mc*, Re*)	(Rv)	(Rv)
OF -	(Mc)	(Rv, Mc)	(None)
Rv -	(Re)	(Re)	(Mc, Re*)
Mc -	(None)	(None)	(None)

* In these entries entries the difference between the overall gamma (or phi) index and the gamma or phi index of small or large scale plants exceeds +.10. In other words these indices are rather *noisy* therefore one should be reluctant to consider them as being representative of the whole or subsets of the whole.

Source: Derived from Tables 3.10 to 3.12

If we exclude these cases we are left with some 67 attribute pairs in which the overall index is greater but close to the index associated with either small or large scale establishments.

Secondly we see that in a number of cases the overall gamma index tends to underestimate the strenght of the areal association amongst production factors as they are observed in small and large scale plants categories in other words;

$\gamma_G < \gamma_L$ and

$\gamma_G < \gamma S$

These pairs are shown in Table 3.14

Table 3. 14 Attribute Pairs in which the overall index tend to Underestimate the real Strenght of the Areal association

Attribute Pairs	Istanbul Side	Beyoglu Side	Anatolian Side
N -	(W, MW, UA, OF*, Mc, Re*)	(MW,CA*,UA*,OF*,Rv,Mc*,Re)	(None)
Adm -	(W*, Re*)	(None)	(Tc, En)
W -	(Rv*)	(UA)	(Re*)
MW -	(None)	(None)	(None)
Tc -	(None)	(None)	(En, CA*)
En -	(None)	(None)	(Ca*)
CA -	(None)	(None)	(None)
UA -	(None)	(Mc, Re)	(None)
OF -	(None)	(None)	(None)
Rv -	(None)	(None)	(None)
Mc -	(None)	(None)	(None)

* In these entries the difference between the overall gamma (or phi) index and the gamma or phi index of small or large scale plants exceeds -.10. In other words these indices are rather *noisy* therefore one should be reluctant to consider them as being representative of the whole or subsets of the whole.

Source: Derived from Tables 3.10 to 3.12

Thirdly we have those cases in which the value of the overall measure of areal association lies in one of the following closed intervals : $[\gamma_S, \gamma_L]$ or $[\gamma_L, \gamma S]$. Spatial distribution of these cases are shown in Table 3.15 below.

Table 3.15 Cases in which the value of the Overall measure of Areal Association γ_G lies in the closed interval defined by Gamma Values Computed for Small and Large Plants.

Attribute Pairs	Istanbul Side	Beyoglu Side	Anatolian Side
N -	(Adm*, Tc*, CA, Rv, Mc)	(Tc,)	(All but UA,Re
Adm -	(En, CA, UA, OF*, Rv, Mc,)	(W,Tc, UA, OF,Re)	(Tc)
W -	(En, Re)	(En, OF, Rv, Re)	(MW, En, Mc, Re)
MW -	(Re)	(CA, UA, OF, Re)	(Tc, En*, CA,UA*)
Tc -	(Rv,)	(Mc,)	(UA*, Rv, Re*)
En -	(UA, OF)	(UA, Re)	(UA*)
CA -	(Rv, Mc)	(OF, Mc,)	(None)
UA -	(None)	(Re)	(OF*, Mc*, Re)
OF -	(Rv, Re)	(Re)	(Rv*, Mc, Re)
Rv -	(Mc)	(Mc)	(None)
Mc -	(Re)	(Re)	(Re)

* In these entries the difference between the overall gamma (or phi) index and the gamma or phi index of small or large scale plants exceeds +-.10. In other words these indices are rather *noisy* therefore one should be reluctant to consider them as being representative of the whole or subsets of the whole.

Source: Derived from Tables 3.10 to 3.12

If those overall indices which are not representative of neither large nor small scale establishments are excluded, the analysis of Tables 3.10 to 3.12 suggests that the following three cases are possible.

1. The overall measure of areal association may be close to that computed for large plants. In such cases, contributions from large plants influence strongly the value of γ_G.
2. The overall measure of areal association may be close to that computed for small plants. In such cases, contributions from

small plants influence strongly the value of γ_G.

3. The overall measure of areal association may be close to those computed for both small and large plants. In such cases the superposition of layers pertaining to small and large plants do not modify the strenght of the areal association and the overall measure of areal association can be taken up as being representative of layers relative to small and large plants.

This grouping would indicate the spatial differentiation of distortion effects stemming from the superposition of these two distinct industrial geographies on each side of the metropolitan area. The superposition of these two layers may lead to an overall index of areal association which may be ;

A. higher than the two indices computed for constituent layers; denoted by the superscript (O)
B. lower than the two indices computed for these constituent layers; denoted by the superscript (U)
C. in between those two indices such entries are denoted by the superscript (B)

On the other hand, we can identify whether the overall index of areal association obtained through the superposition of these two layers is;

1. representative of the index computed for the layer pertaining to small plants; such entries are denoted as (s)
2. representative of the index computed for the layer pertaining to large plants; such entries are denoted as (l)
3. representative of both indices computed for small and large

plants; such entries are denoted as (sl)

4. noisy. (ie. not representative of small nor large plants). denoted by the subscripts (n)

Table 3.16 Distortions on Gamma indices on the Istanbul Side

	N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re
N	*	$[_{n}^{b}]$	$[_{l}^{u}]$	$[_{l}^{u}]$	$[_{n}^{b}]$	$[_{l}^{u}]$	$[_{l}^{b}]$	$[_{l}^{u}]$	$[_{n}^{u}]$	$[_{l}^{b}]$	$[_{l}^{u}]$	$[_{n}^{u}]$
Adm		*	$[_{n}^{u}]$	$[_{l}^{o}]$	$[_{s}^{o}]$	$[_{l}^{b}]$	$[_{l}^{b}]$	$[_{l}^{b}]$	$[_{n}^{b}]$	$[_{n}^{b}]$	$[_{l}^{b}]$	$[_{n}^{b}]$
W			*	$[_{sl}^{o}]$	$[_{s}^{o}]$	$[_{l}^{b}]$	$[_{sl}^{o}]$	$[_{l}^{o}]$	$[_{l}^{o}]$		$[_{sl}^{o}]$	$[_{l}^{b}]$
MW				*	$[_{s}^{o}]$	$[_{n}^{o}]$	$[_{sl}^{o}]$	$[_{n}^{o}]$	$[_{l}^{o}]$	$[_{n}^{o}]$	$[_{n}^{o}]$	$[_{l}^{b}]$
Tc					*	$[_{sl}^{o}]$	$[_{sl}^{o}]$	$[_{l}^{o}]$	$[_{l}^{o}]$	$[_{l}^{b}]$	$[_{sl}^{o}]$	$[_{l}^{o}]$
En						*	$[_{sl}^{o}]$	$[_{l}^{b}]$	$[_{n}^{b}]$	$[_{l}^{o}]$	$[_{l}^{o}]$	$[_{l}^{b}]$
CA							*	$[_{l}^{o}]$	$[_{l}^{o}]$	$[_{l}^{b}]$	$[_{sl}^{b}]$	$[_{l}^{o}]$
UA								*	$[_{n}^{o}]$	$[_{n}^{o}]$	$[_{n}^{o}]$	$[_{n}^{o}]$
OF									*	$[_{l}^{b}]$	$[_{l}^{o}]$	$[_{l}^{b}]$
Rv										*	$[_{l}^{b}]$	$[_{l}^{o}]$
Mc											*	$[_{l}^{b}]$
Re												*

Source: Computed from Neighborhood Simplices derived from the Q-Analysis of Area Code Assigned Capacity Reports

Subscripts in each entry indicate whether the overall index of areal association (dissociation) is representative of the layers pertaining to ;

a. None of these layers

b. That of large plants,

c. That of small plants

d. That of small and large plants.

Notice that the distortion effect generated by the superposition of the layers pertaining to small and large scale establishments is not uni-directional. In fact, out of a total of 66 entries shown in Table 3.16 no less than 17 represent neither large nor of small plants. Such a distortion would not be generated, if small and large scale plants did not exhibit significantly different patterns of areal association in terms of these attribute pairs and (or) if the superposition of these two layers did not generate a number of attributes of marginal importance or pseudo-attributes. As a result of these distortions, in 8 entries γ_G assume values that are higher than those computed for small and large plants. In three cases γ_G conveys a weaker account of the observed strenght of areal association and in the remaining (6 entries) γ_G assumes values between those computed for small and large scale establishments while being significantly distant from both.

It would therefore be pertinent to consider these γ_G indices as being extremely noisy and misleading. However, such noisy indices are not randomly distributed. They concern areal associations with the following 5 industrial attributes: (N; 4 cases), (Adm; 4 cases), (MW; 4 cases), (En; 1 case) and (UA; 4 cases).

Secondly, in some 36 entries γ_G indices are close to those observed in large plants. In other words, in more than the half of entries, the overall index is *not* representative of the properties of the layer related to small plants.

Thirdly, γ_G assumes values similar to those derived for small plants in only 3 entries. However a comparison of relevant indices in Table 3.16 suggests that such cases are few. Finally Table 3.16 suggests that γ_G is representative of both layers in only 9 out of a total of some 66 entries. And although in 8 cases γ_G tends to over-emphasize, differences are negligeable.

The conclusion is that in the Istanbul side, γ_G is representative in only 14 % of the entries. This, surely is, a very low level of representativity. It must be emphasized that in no less than 26 % of entries, γ_G conveys a totally misleading picture of the situation in *both* layers. Notice also that γ_G assumes values close to those observed in the layer related to large plants in some 54 % of the cases. Thus, γ_G is either representative of patterns observed in the large plants category or is simply misleading. It does not contribute to our understanding of the industrial geography of small plants in the istanbul side.

Before concentrating on the implications of these results, it would be pertinent to see whether similar distortions are observed in other sectors of the metropolitan area or not ?

3.4.1 Representativity of the Overall Index of Areal Association γ_G on the Beyoglu Side

Results derived from a similar analysis of representativity are summarized in Table 3.17 which depicts a slight decrease in the number of non representative (noisy) indices 21 % and a non negligeable decrease in the number of cases in which the overall index is representative of large plants (from 54 % in the Istanbul side down to 30 % in Beyoglu Side).

These decreases are compensated by significant increases in the number of entries in which the overall index γ_G is representative of the stenght of areal association in the layer pertaining to small plants.

In 16 % of the entries in Table 3.17 the overall index γ_G assume values close to those observed in the layer pertaining to small plants. This suggests a noticeable increase with respect to Istanbul side where the corresponding rate was as low as 4 %.

On the other hand, a comparison of Tables 3.16 and 3.17 suggests a considerable increase in the number of entries in which the overall index γ_G is representative of the situation in both layers; from 9 % in the Istanbul Side up to 18 % .

Table 3.17 Representativity of the Overall Index of Areal Association γ_G on Beyoglu Side

	N	Adm	W	MW	Tc	En	CA	UA	DF	Rv	Mc	Re
N	*	$[_{s}^{u}]$	$[_{s}^{u}]$	$[_{l}^{u}]$	$[_{s}^{b}]$	$[_{n}^{o}]$	$[_{n}^{u}]$	$[_{n}^{u}]$	$[_{n}^{u}]$	$[_{l}^{b}]$	$[_{n}^{u}]$	$[_{n}^{b}]$
Adm		*	$[_{sl}^{b}]$	$[_{n}^{o}]$	$[_{sb}]$	$[_{sl}^{o}]$	$[_{s}^{o}]$	$[_{l}^{b}]$	$[_{sl}^{b}]$	$[_{n}^{o}]$	$[_{sl}^{b}]$	$[_{n}^{b}]$
W			*	$[_{n}^{o}]$	$[_{n}^{o}]$	$[_{l}^{b}]$	$[_{n}^{o}]$	$[_{s}^{u}]$	$[_{sl}^{o}]$	$[_{s}^{b}]$	$[_{sl}^{b}]$	$[_{l}^{b}]$
MW				*	$[_{sl}^{o}]$	$[_{lo}]$	$[_{l}^{b}]$	$[_{sl}^{b}]$	$[_{sl}^{b}]$	$[_{slo}]$	$[_{sl}^{b}]$	$[_{l}^{b}]$
Tc					*	$[_{s}^{o}]$	$[_{sl}^{o}]$	$[_{sl}^{o}]$	$[_{s}^{o}]$	$[_{n}^{o}]$	$[_{s}^{b}]$	$[_{l}^{o}]$
En						*	$[l^{o}]$	$[_{sl}^{b}]$	$[_{n}^{o}]$	$[_{l}^{o}]$	$[_{l}^{o}]$	$[_{l}^{b}]$
CA							*	$[_{s}^{b}]$	$[_{l}^{b}]$	$[_{n}^{o}]$	$[_{s}^{b}]$	$[_{l}^{o}]$
UA								*	$[_{sl}^{u}]$	$[_{l}^{o}]$	$[_{sl}^{u}]$	$[_{l}^{u}]$
DF									*	$[_{l}^{o}]$	$[_{l}^{o}]$	$[_{l}^{b}]$
Rv										*	$[_{l}^{b}]$	$[_{l}^{o}]$
Mc											*	$[_{l}^{b}]$
Re												*

Source: Computed from Neighborhood Simplices derived from the Q-Analysis of Area Code Assigned Capacity Reports

3.4.2 Representativity of the Overall Index of Areal Association γ_G On the Anatolian Side

Table 3.18 which shows the representativity of the overall index of areal association suggests that in no less than 21 entries (32 %) the overall index is not representative of neither small nor of large plants. In only 5 entries γ_G assumes values that are close to those observed in the layer relative to small plants. In 12 % of entries (8 cases) the γ_G is representative of both small and large plants. And finally in 48 % of the cases (in 32 out of a total of

66) γ_G assumes values that are very close to those observed in the layer relative to large plants.

Table 3.18 Analyses on the Representativity of the overall Index of Areal Association γ_G in the Anatolian Side

	N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re
N	*	$[_n^b]$	$[_n^b]$	$[_{\blacksquare}^b]$	$[_n^b]$	$[_n^b]$	$[_n^b]$	$[_n^o]$	$[_{\blacksquare}^b]$	$[_{\blacksquare}^b]$	$[_n^b]$	$[_n^o]$
Adm		*	$[_{\blacksquare 1}^o]$	$[_{\blacksquare 1}^o]$	$[_{\blacksquare 1}^u]$	$[_{\blacksquare 1}^o]$	$[_{\blacksquare 1}^b]$	$[_1^o]$	$[_{\blacksquare 1}^b]$	$[_n^o]$	$[_1^b]$	$[_n^u]$
W			*	$[_1^b]$	$[_{\blacksquare}^b]$	$[_1^b]$	$[_n^o]$	$[1^o]$	$[_1^o]$	$[_1^o]$	$[_1^b]$	$[_1^b]$
MW				*	$[_1^o]$	$[_1^b]$	$[_{\blacksquare 1}^b]$	$[_n^b]$	$[_1^o]$	$[_1^o]$	$[_1^o]$	$[_1^o]$
Tc					*	$[_{\blacksquare 1}^u]$	$[_n^u]$	$[_n^u]$	$[_1^o]$	$[_1^b]$	$[_1^o]$	$[_n^u]$
En						*	$[_n^u]$	$[_n^b]$	$[_1^o]$	$[_1^o]$	$[_1^o]$	$[_1^o]$
CA							*	$[_1^o]$	$[_n^o]$	$[_{\blacksquare}^o]$	$[_1^o]$	$[_n^o]$
UA								*	$[_n^b]$	$[_1^o]$	$[_1^o]$	$[_1^u]$
OF									*	$[_1^b]$	$[_1^b]$	$[_1^b]$
Rv										*	$[_1^o]$	$[_n^o]$
Mc											*	$[_1^b]$
Re												*

Source: Computed from Neighborhood Simplices derived from the Q-Analysis of Area Code Assigned Capacity Reports

These findings are summarized in Table 3.19 which illustrates the fact that there exiists noticeable spatial variation in the level of representativity of the over all index γ_G.

Table 3.19 Geographic Variation in the Representativity of the General Index of Areal Association

Geographic Components	Layer Relative to Small Plants	Layer Relative Large Plants	Both Layers	None of the Two Layers	
Istanbul Side	3 (4,5 %)	37 (56 %)	9 (14 %)	17 (26 %)	
Beyoglu Side	11 (16 %)	23 (30 %)	18 (27 %)	14 (21 %)	
Anatolian Side	5 (8 %)	32 (48 %)	8 (12 %)	21 (32 %)	
Total	19 (10 %)	92 (46 %)	35 (18 %)	52 (26 %)	198

Source : Derived from Tables 3.16 to 3.18

Geographic variation in the level of representativity of γ_G implies the following. It gives an idea on the magnitude of the confounding error one may commit if the landscape analysis is *not* carried out on a geographically disaggregated basis. It is interesting to note that γ_G assumes relatively stable values when it is not representative at all. Even there the magnitude of the geographical variation is as high as 50 %.

Secondly, (although it depicts high geographic variation), the overall index γ_G appears to have been influenced more often than not by the layer relative to large plants. Thus, small plants which account for 70 % of the total plant population, 30 % of the total industrial employment, and 15 % of the total industrial capital of the metropolis generally fail to leave their mark on the production space. This stems from two important factors:

a. Differences in the spatial distribution patterns of small and large plants
b. Differences in the intensity of production factors endowments.

Our exploratory quantitative study indicates that there exist major differences between production factor deployment patterns between small and large plants. While large scale plants can be considered to reveal a comparatively decentralized distribution pattern. Small plants show both concentration and dispersion tendencies at the same time. Thus, while it is possible to find small plants up to a distance of 50 km from the metropolitan center they are mostly concentrated within a limited number of neighborhoods in and around the metropolitan center. For instance the first concentric ring from the center of the metropolis accounts for 65 % of the small plants population and that the share accounted by only 10 neighborhoods in the Maltepe (Topkapı) -Topçular production complex is no less than20% . Although these neighborhoods constitute the core of the small scale industrial production in Istanbul, as they are few in number, the signals they generate appear to have been disturbed by by those stemming from decentralized large plants.

Secondly, we have seen that on the average large plants employs 4.5 times more and are endowed wth 11 times more capital. Although these figures are rough estimates it would not be wrong to consider one large plant in Istanbul as being capable to counter-balance employment concentrations from 4.5 small plants or spatial concentrations of industrial capital from 11 small plants.

When these two factors are allowed to operate freely and jointly as they do in the production space of Greater Istanbul, there is nothing surprising in the fact that the overall index of areal association γ_G tends to assume values that are rather close to those observed in the layer pertaining to large plants. Notice that the overall index of areal association assumes values that are close to their counterparts in the layer pertaining to large plants in 56 % of the entries in the Istanbul side (see Table 3.19), in 48 % of the entries in the Anatolian and in 30 % of the entries on the Beyoglu side.

Differences in terms of capital intensity, and the weight assumed by the layer relative to large plants, suggest that it is surely not a coincidence that γ_G indices among items of capital assume values that are very close to those in large plants in each side of the metropolitan area.

In other words, the general index of areal association arises, more often than not, as being representative of the situation in the layer generated by large plants or as being noisy (ie not representative of either layer). As clearly shown in Table

3.19 the number of entries in which γ_G is representative of both layers is very limited. Because of all these distortions the general representativity of the overall index γ_G arises as being an exception rather than a general rule.

Evidently all of these are very sound arguments against the use of γ_G as a descriptive device in the analysis of the industrial landscapes at least a far as Greater Istanbul is concerned.

Finally, geographic variation in the degree of representativity of the overall index of areal association γ_G and its specific distribution pattern within each side can be taken up as macro level indicators pertaining to the dominant industrial geographic character of each side of the metropoitan area. It is interesting to see that γ_G's computed for the Beyoglu side are (relatively speaking) highly representative of areal associations in the small plants layer. (see Table 3.19) In fact, in no less than 11 entries (out of a total of 66) the overall index of areal association tend to be representative of the features observed in the small plants layer. (Notice that this is the highest percentage amongst three sides of the metropolitan area). This surely is not unrelated with the fact that Beyoglu side is, amongst three sides of the metropolitan area, the one in which small plants account for the largest share in the total plant population (77 %) Thus, we see that the layer pertaining to small plants is comparatively more influential in shaping the general industrial geographic characteristics of this particular sector.

The same is not true on Anatolian side, where, small plants account for only 54 % of the total plant population, where features relative to small plants are represented in only 8 % of the entries in the correlation matrix. (See Table 3.19) However, this does not always hold true for, small plants which constitute % 70 of the total plant population in Istanbul side happen to influence the strenght of the overall areal associations in only two entries. Even there, indices computed for the layer relative to large plants assume very similar values.

This rather long analysis of sensitivity illustrates that γ_G is not a relevant descriptive tool in landscape analysis. If we opt for this easy solution, we are bound to base our interpretations on matrices in which, no less than 25 % of entries transmit nothing more than noise, that fail to translate the specificity of the layer relative to small plants and finally that assume values irrelevant to those cases seen in the layer relative to large plants.

It follows that it is not relevant to use γ_G as a descriptor of structural links, since it introduces non- negligeable distortions and superficial connections, or tends to convey a weaker (or stronger) account of the situation.

But do these methodological conclusions point out to the impossibility and irrelevance of a general industrial landscape analysis in Greater Istanbul ? In a sense they do. Here we derive a conclusion that is perfectly in line with our previous results derived from the quantitative analyses of the same industrial landscape.

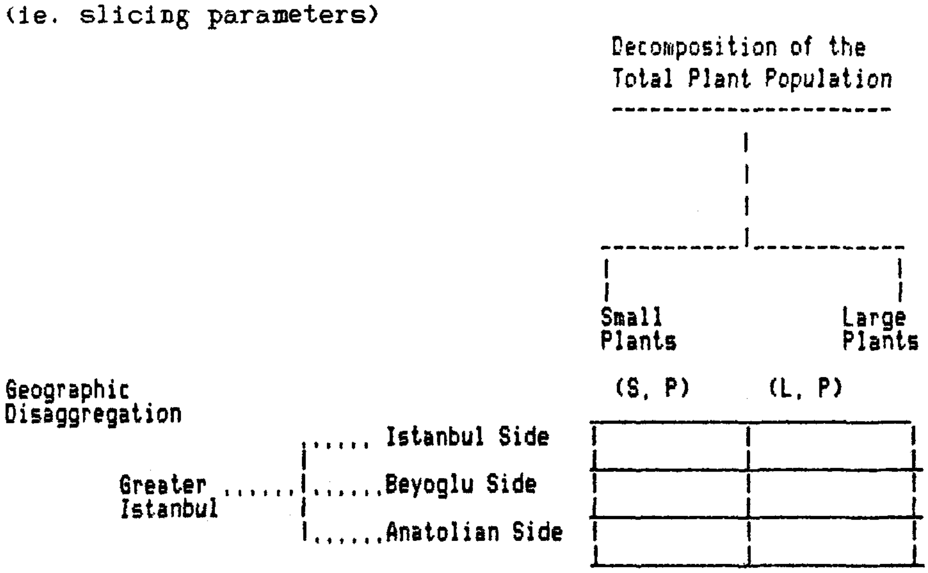
However, this study also shows that if industrial landscape analysis is carried out on a geographically and economically disaggregated basis, students can side-step these difficulties and come up with geographically and economically relevant results. In the fourth chapter, these insights are used to extract the properties of this complicated industrial landscape and to depict specific characteristics of each one these two layers in each geographical component of the metropolitan area.

CHAPTER IV

STRUCTURAL ANALYSES ON INDUSTRIAL *GEOGRAPHIES* OF GREATER ISTANBUL

4.1 Introduction

This section attempts to make use of previously derived hints and to provide the reader with a parsimonius description of these landscapes. But if the structural analysis of these industrial landscapes is [as our previous conclusions strongly suggest] to be carried out on a geographically and economically disaggregated basis it will require detailed analyses on no less than six geographical matrices. In other words if we are to follow our conclusions we will have to fill in the following six cases. We have also seen that the scale of analysis weighs heavily on the results so it is preferable to study the dependency of results on the scale of the analysis, (ie. slicing parameters)



Although our data retrieval system enables us to meet the data requirement of this matrix, there exists formidable obstacles if students opt for a parsimonius description of structural features. We will try to show that using incidence matrices as high order representations of industrial landscapes it is nonetheless possible to side step most of the difficulties of an idiographic approach because here we have too much data. To sidestep this difficulty one may think of aggegating industrial attributes. This surely will reduce the number of colums in each industrial matrix and alleviate the problem of interpretation. But it would be a flagrant contradiction aggregating attributes while intorducing geographical disaggregation. It is possible to aggregate say different categories of industrial employment under the heading total number of plant operatives it surely will lead to a considerable loss of information. While there is no point in working with over detailed categories we fear that in this case such an aggregation would amount to a considerable loss of information. For if different places are specialized in different categories of industrial labour or if different categories of industrial labour are associated with different industrial attributes such an aggregation would filter off all this variation and produce signals that would be either trivial or hardly interpretable. On the contrary if we insist in working with all the 12 attribute of places and try to concentrate on the nature and the strenght of areal associations among different pairs a geogaphically and industrially specific landscape analysis it would take a lot of space. Notice that in each matrix of gamma indices we have 66 non trivial cases and if we write one paragraph for each entry the interpretation of each one of these matrices would require no less than 66 paragraphs. It follows that if we do not devise a way out of this impasse we are bound to write down no less than 396 paragraphs (6 x 66) just to interpret these matrices or quit this task as being not feasible. It surely is not a coincidence that we have so few general industrial landscape analyses.

These industrial landscapes can be easily studied through diagrammatic representations of the same matrices. This would facilitate the detection of similarities and dissimilarities in the spatial association of production factors. In fact, differences and/or similarities in the features of different layers will be reflected in these representations. One can then translate these differences into an interpretative and comparative text. This proceedure may facilitate comparisons. To facilitate exposition it would be convenient to concentrate on procedure and conventions.

4.2 Procedure and Conventions;

Matrices showing the strenght and the direction of the areal association amongst different pairs of industrial attributes constitute the basis of this landscape analysis. As the gamma index assumes values between -1 and +1 they can be grouped and shown graphically. In this chapter each industrial landscape will be represented as a globe. Different categories of industrial employment are placed on the east side different categories of capital are placed on the west side, and attributes showing concentration in terms of number of plants and land use are placed on the poles.

As it was the case in our quantitative exploratory study, we have opted for a top-down approach. We proceed in the following order;

1. General industrial geography of Greater Istanbul
2. (General) industrial geographies of the three sides of the metropolitan area
3. Structural features of layers relative to small and Large plants within Greater Istanbul metropolitan Area.
4. Structural features of layers relative to small and large plants within Istanbul Side.
5. Structural features of layers relative to small and large plants within Beyoglu Side.
6. Structural features of layers relative to small and large plants within Anatolian Side.

One may rightfully question, the reason why in the first three steps we do take up studies that are not geographically and economically disaggregated and this, in spite of all conclusive evidence not to proceed in this way emphasized in the previous chapter ?

These inadequately disaggregated representations are included, not because they do convey a relevant account of the metropolitan industrial landscape, but because they constitute a starting point for subsequent geographically relevant interpretations of the same landscape. This order of presentation would, not only illustrate reduction of noise but would also enable the reader to participate in this process of exploration. The amount of space and discussion allocated for geographically and economically disaggregated analyses would indicate that our emphasis is not on these noisy accounts.

4.3 General Industrial Geography of Greater Istanbul

Table 3.2 shows the strenght of the areal association amongst different factors of industrial production for the entire metropolitan area. Analyses of sensitivity summarized in the third chapter indicated that these indices tend, more often then not, to be representative of the layer relative to large plants and that about 25 % of them are significantly distorted. Thus gamma values produced in Table 3.2 tend to hide more than they reveal. On the other hand do not have at our disposal sufficient variation. It is therefore extremely difficult for an analyst to come up with a plausible account of this noisy landscape.

These properties are shown in Figure 4.1. Notice that Figure 4.1 includes no less than 55 out of a total of 66 possible links. It is of course quite hard to see through this complexity. Nonetheless one could immediately two signals that one could decipher. First, as it could be seen from Table 3.2 and as it is illustrated in Figure 4.1 all of the missing links relate to areal associations of the

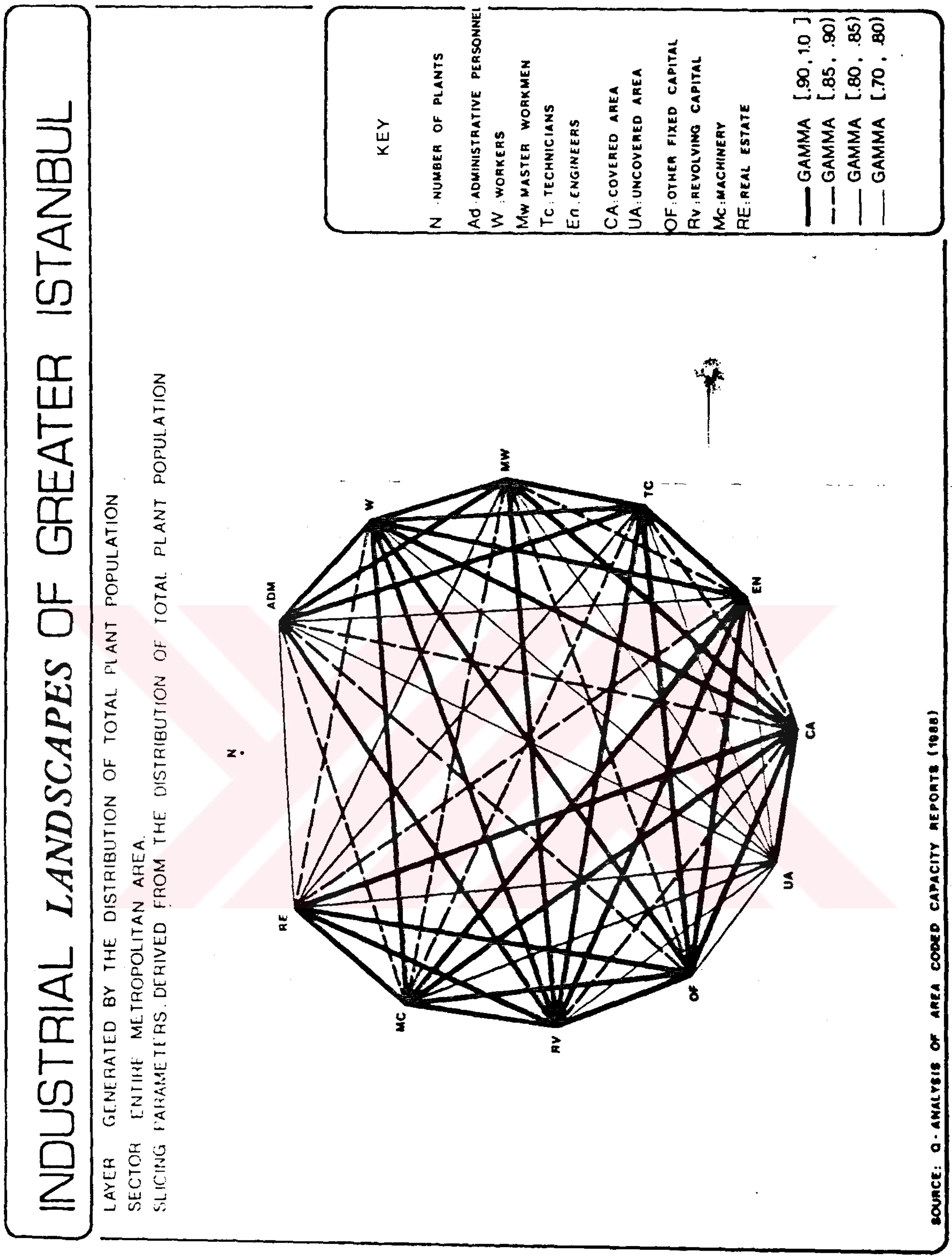


Figure 4.1 Greater Istanbul Spatial Associations among Industrial Attributes (Slicing Parameters: General)

attribute Number of plants with other industrial attributes. . Such a result would not be observed at all if;

a. a noticeably high number of neighborhoods did not emerge in this as being important in terms of plants only.
b. a number of neighborhoods that are important in terms of other attributes were also endowed with the attribute "Number of plants". (neighborhoods at fringes)

As expected neighborhoods that are important in terms of number of plants only are mostly located in and around metropolitan center and those that are important in attributes other than Number of plants are mostly located at fringes. Thus, these 11 missing links illustrate a structural difference between the core and the periphery of the metropolis. The second signal relates to the weakness of links between Uncovered area and other attributes. In fact, only one out of the ten links has a gamma index exceeding .90. Remaining nine linkages depict gamma indices between .80 and .85. Hence, when the entire metropolitan area is considered, it is possible to conclude that as an attribute Uncovered Area is more closely and positively associated with the attributes Machinery and Real Estate capitals than it is with different employment categories. The information content of these two signals is extremely low and that they could be considered as mere trivialities that are probably true in most industrial landscapes. Our previous analyses have shown that as a general index of spatial association γ_a tends to be extremely noisy. Thus, even these two trivial conclusions can not be taken up too seriously.

It is evident that by repeating the same type of analysis in each geographical component of the metropolitan area it is possible to check whether there are other signals or not ?

But one can easily see that geographic disaggregation modifies the areal extent of the study (a population made of neighborhood simplices) while leaving the definition of individuals and the scale of analysis as they are. This geographical disaggregation may enable us to detect less trivial signals.

Those signals which resist geographical disaggregation can be taken up as generalcharacteristics of the industrial landscape and those that depict strong spatial variation (-in terms of the strenght or the direction of the relation) can be taken up as illustrating in terms of specificities. Obviously both aspects are extremely important in any spatial analysis. In brief this simple exercice in spatial disaggregation may provide us more insights both on generalities and specificities hence it seems to be a fruitful exercice.

This brings us to the second step of our landscape analysis in which general industrial geographies of the three sides of the metropolitan area are separately analyzed.

4.4. General Industrial Geographies of the Three Sides of the Metropolitan Area

Properties of the industrial landscapes of each side of the metropolitan area are shown Figure 4.2, which indicates that characteristics of the overall represensation (Figure 4.1) cannot be easily generalized in all three sides of the metropolitan area. Nonetheless, one can detect, quite a number of similarities (both in terms of number and the strenght of spatial associations) between Figure 4.1 and Figure 4.2 (b) which relate to the Istanbul side. Notice also that, non negligeable discrepancies exist between Figure 4.1 and Figures 4.2.(a) and 4.2.(c) which relate to Beyoglu and Anatolian sides respectively.

A comparison of the total number of links and their distribution according to different categories of spatial association shown in Figure 4.1, produces a picture that resembles to the one produced for the Istanbul side, consequently it fails to be representative of industrial landscapes observed on Beyoglu and Anatolian Sides. In their turn, latter sides exhibit non-negligeable differences between themselves.

Thus, the overall representation of the metropolitan production space tends, not only to be representative of the layer relative to large plants it also produces a picture similar to the one observed on the Istanbul side while being irrelevant for other sides.

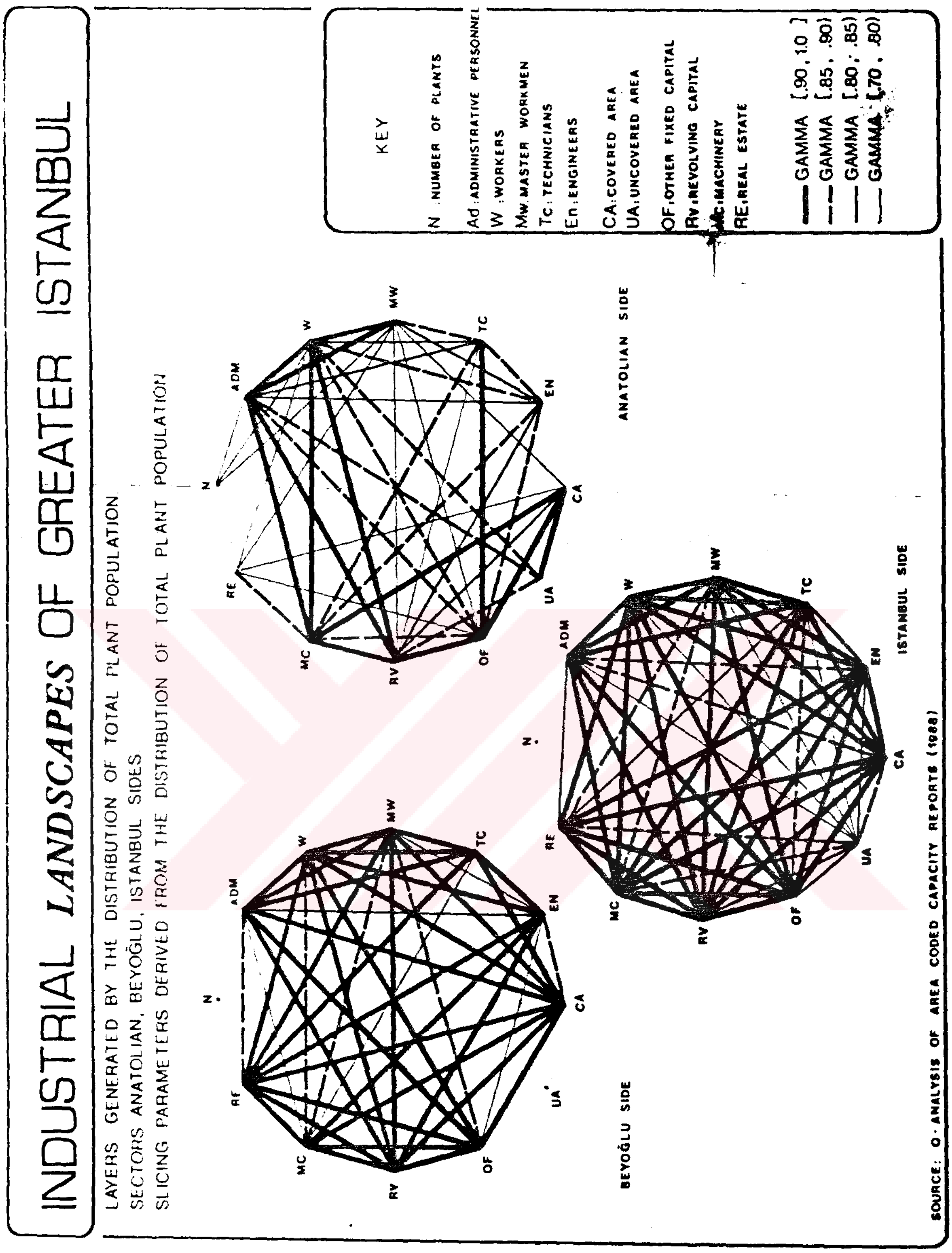


Figure 4.2 Spatial Associations among Industrial Attributes in Beyoglu, Istanbul and Anatolian Sides

Similarities and discrepancies summarized in Table 4.1 suggest that each side of the metropolitan area depict almost unique characteristics in terms of the distribution of links in each weight category. In fact, while links in category 1 ($\gamma \in [.90, 1.]$) account for no less then 76 % of all links on the Beyoglu Side the same rate is found to be as low as 28 % on the Anatolian side.

Table 4.1 Distribution of Links According to Different Categories of Areal Association in the General** Industrial Landscape and in its Geographical Components

	Category 1	Category 2	Category 3	Category 4	
	$\gamma \in [.90,1.]$	$\gamma \in [.85,.90)$	$\gamma \in [.80,.85)$	$\gamma \in [.80,.80)$	Total
	[%]	[%]	[%]	[%]	
General** Landscape	30 [54]	12 [22]	7 [13]	6 [11]	55
Istanbul Side	37 [67]	8 [15]	5 [9]	4 [7]	54
Beyoglu Side	31 [76]	5 [12]	1 [2]	4 [10]	41
Anatolian Side	12 [28]	13 [30]	8 [19]	10 [23]	43

** General industrial landscape includes three *sides* of the metropolitan area

Source : Derived from Figures 4.1 and 4.2 [a], 4.2 [b], 4.2 [c]

The distribution of links amongst different categories shows that the general landscape shown in Figure 4.1 conveys a fairly good account of the situation on the Istanbul side. However, under the influence of distribution patterns observed on the remaining two sides, there exists a reduction in the percentage of links in categories 1, 2 and 4 and an increase in the percentage of links in category 3. Thus the weight jointly exerted by Beyoglu and Anatolian sides generate differences of degree but not of kind.

Beyoglu and Anatolian sides are similar in terms of ***number*** of links only, Table 4.1 and Figures 4.2 (a) and 4.2 (c) suggest that they have inherently different industrial landscapes. These differences can be summarized as follows;

a. the industrial landscape of the Beyoglu side is characterized with a high number of high order links while the opposite is true for the Anatolian side where links are almost evenly distributed.

b. Anatolian side shows distinct characteristics as far as links with the attributes Number of Plants and Uncovered Area are concerned. While latter attributes are disconnected on the Beyoglu Side (see Figure 4.2 (a)) they are linked with other attributes on the Anatolian side.

c. Anatolian side which depicts the most decentralized distribution pattern for industrial establishments stands out with lowest levels of areal association amongst production factors. (Güvenç, (1992)) In other words, the decentralized plant distribution pattern observed on the Anatolian side generates an industrial landscape characterized with comparatively low order associations among attributes. As expected the concentrated plant distribution pattern observed on the Beyoglu side generates high levels of spatial association amongst most attributes.

The overall picture of the metropolitan landscape can be considered as being representative of the situation on the Istanbul Side only. It is not relevant for the situation on the Beyoglu side because its neighborhoods are generally not endowed with the attribute Uncovered Area. Hence the specific industrial geographic characteristic of the Beyoglu side, in which, production activities are carried out within Covered Areas seems get 'lost' in geographical aggregation. These simple conclusions do support and generalize Professor Tümertekin's observations on lofts which constitute the specific character of industrial concentration areas on the Beyoglu side.

Finally, the industrial landscape of the Anatolian side is simply not represented at all. Thus, even the two simple conclusions derived in the previous paragraph must be qualified, as they do not hold true on Anatolian and Beyoglu Sides. The specific character of latter sides is misrepresented in the general account.

4.5 Structural features of Layers Relative to Small and Large Plants; an Overview on the Specific Industrial Geographies of Small and Large Plants

Links depicting both the direction and the strenght of areal association amongst different factors of production in the layer relative to small and large plants are shown in Figure 4.3 (a-b).

One can easily detect by inspection, similarities between Figure 4.1 representing the industrial geographic features of the total plant population in the entire metropolitan area and Figure 4.3 a (relative to large plants), as well as important dissimilarities between Figure 4.1 and 4.3 (b) (relative to small plants). These similarities and discrepancies are summarized -as it was the case before- in Table 4.2 in terms of number of links and their distribution according to different categories of weight.

Table 4.2 Distribution of Links of Areal Association by Categories of Strenght in the General** Industrial Landscape and within its Constituent Layers ie. Layers Relative to Small and Large Scale Plants)

	Category 1 γ ε [.90,1.]	Category 2 γ ε [.85,.90)	Category 3 γ ε [.80,.85)	Category 4 γ ε [.80,.80)	Total
	[%]	[%]	[%]	[%]	
General** Landscape	30 [54]	12 [22]	7 [13]	6 [11]	55
Layer Relative to *Small* Plants	1 [3]	8 [22]	9 [25]	18 [50]	52
Layer Relative to *Large* Plants	12 [23]	14 [27]	14 [27]	12 [23]	36

** General industrial landscape includes three *sides* of the metropolitan area

Source : Derived from Figures 4.1 and 4.3 [a], 4.3 [b]

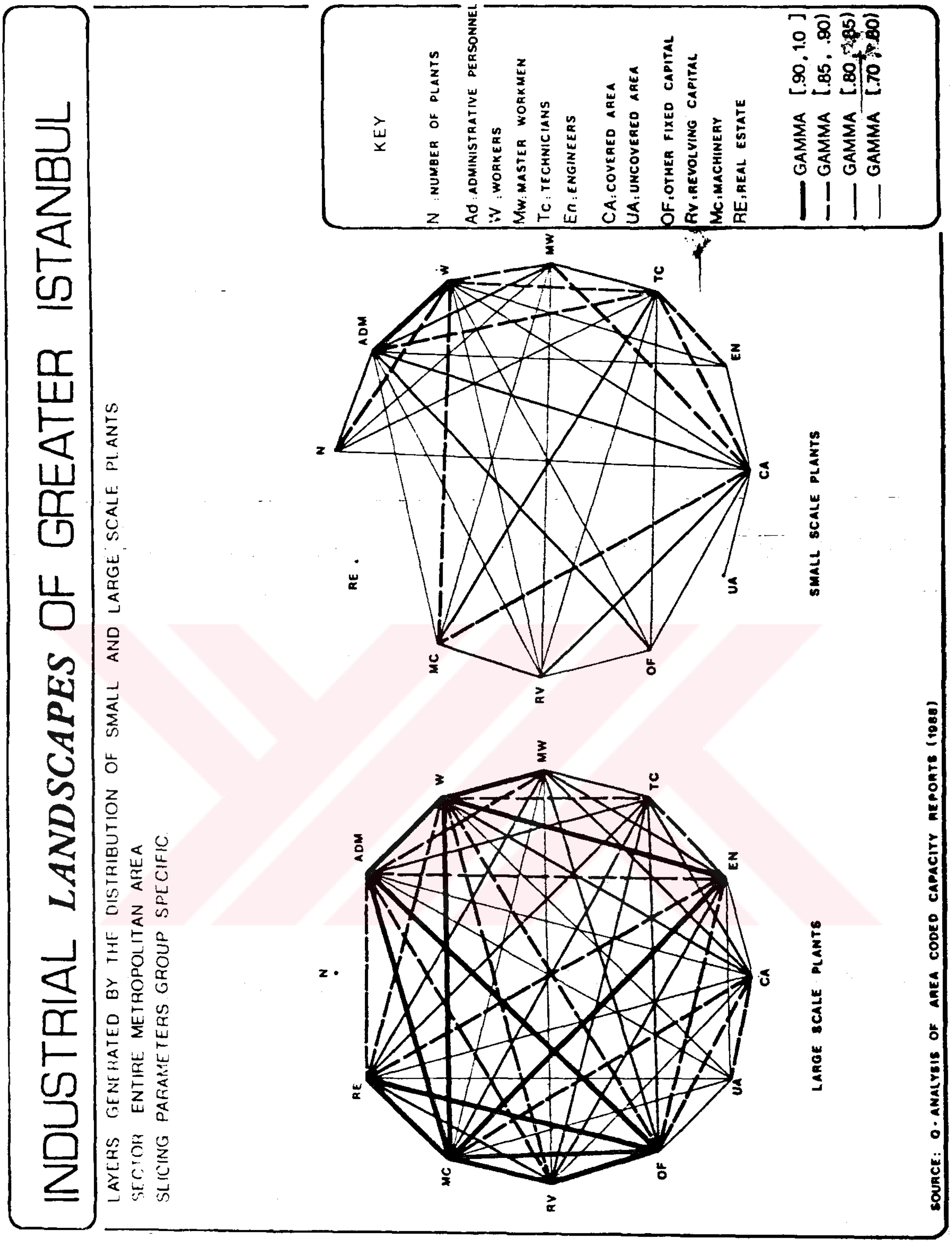


Figure 4.3 (a'-b') Spatial Associations among Industrial Attributes in Large (a') and Small Plants (b') Slicing Parameters: General

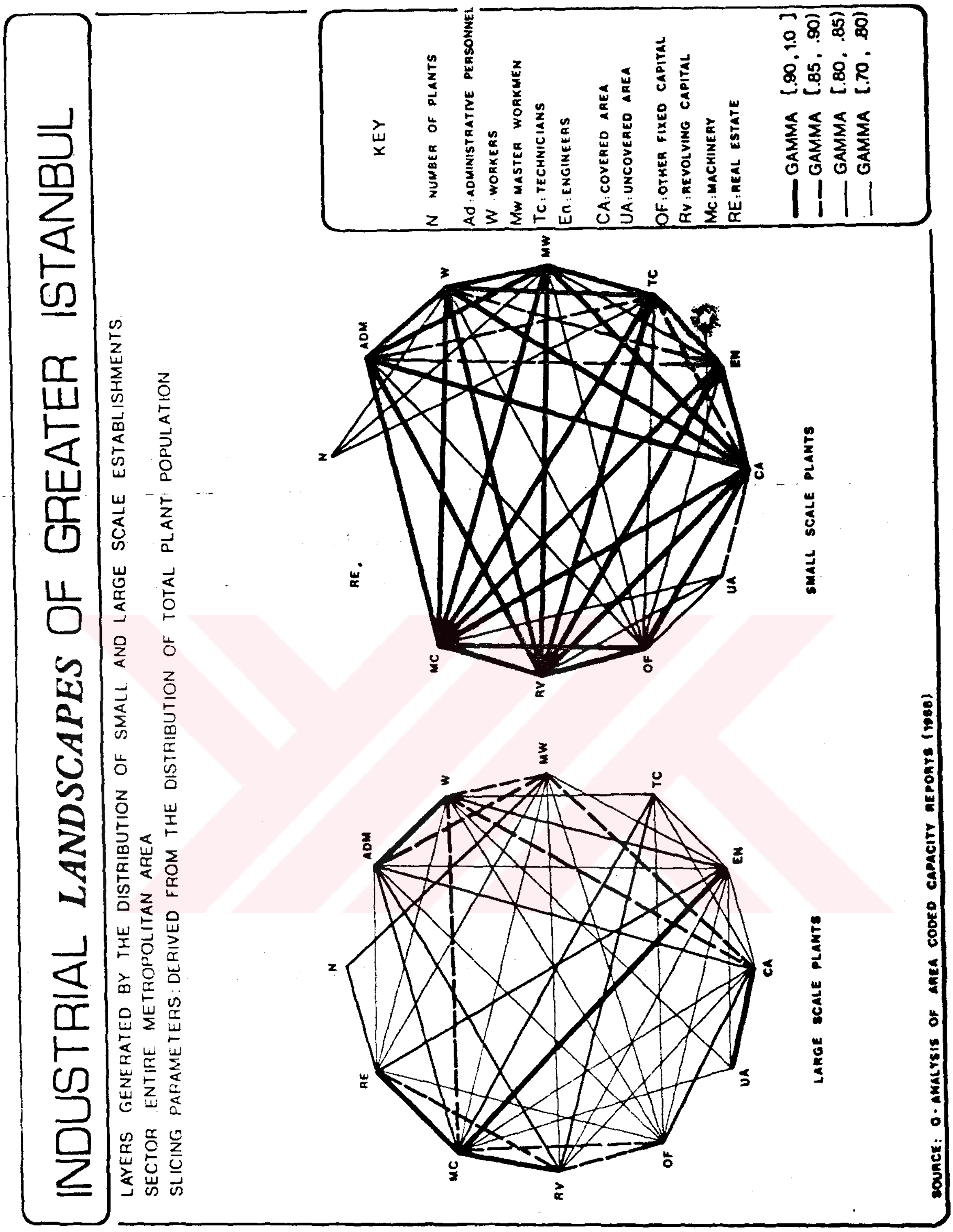


Figure 4.3 (a-b) Spatial Associations among Industrial Attributes in Large (a) and Small Plants (b) : SP: Group Specific.

The structural contrast between these three industrial landscapes can be studied in a variety of ways. For the clarity of exposition, here, we propose an approach in which differences in the number and the distribution of link are discussed in the first place, followed by a comparative analysis of these three landscapes.

It is important to note the similarity between the layer relative to large plants and the general industrial landscape in terms of linkages that are not filtered out. In fact, as opposed to some 55 links which describe the characteristics of the general metropolitan production space we need no less then 52 to describe large plants's layer. Considering the highly connected networks through which these landscapes are described, it would be convenient to concentrate on those links that are missing.

Notice that the three missing links relate to associations of Uncovered Area with the following attributes; Master Workmen, Technicians, and Revolving Capital. This suggests that our previous general conclusion on the relatively low areal associations with the attribute Uncovered Area can be generalized as being one of the most distinct characteristics of the metropolitan industrial landscape. Notice that these linkages are also absent in Figure 4.3 (b).

But the matrix of Gamma indices (derived for large plants) shows that two of these links (UA-MW and UA-Tc) are filtered out.. However in both cases we have a Gamma value of .69 against a threshold value of .70. If we include these links on the landscape of large plants, the only link that is truely missing relates to the

the pair UA-Rv which has the third lowest gamma value on the general landscape.

Thus, the comparison of the general industrial landscape and the layer relative to large plants yields (approximately) a one-to-one correspondance in terms of number of links. But, similarity in terms of connectivity implies that there exists no room to accomodate the specificity of the industrial geography of small plants. Notice that in Figure 4.3 (b) small plants depict fairly developed linkages among different categories of employment and relatively few linkages among categories of capital. Also as opposed to comparatively high number of linkages with the attribute Uncovered area shown in Figure 4.3.(a), there exists only one such link in Figure 4.3.(b). Hence, if the trivial difference pertaining to the lack of linkages with the attribute Real Estate Capial is set aside, the only significant difference that exist between Figures 4.3.(a) and 4.3.(b) relates to the presence of linkages with the attribute Number of Plants in the latter. In other words the connectvity pattern observed in Figure 4.1 stems from the layer relative to large plants. Although under the impact of small plants, Gamma indices associated with N are generally higher than their counterparts in large plants, none of them reaches the critical value of .70. It follows that because of the formidable differences in terms of factor intensity, the layer relative to small plants misses the only chance it has to leave a structural mark on the representation of general industrial landscape. So, the layer relative to small plants cannot do anything but *to get lost* in this thightly knitted network.

Does this result point out to the impossibility of a general industrial geographic study of Greater Istanbul, as in each case, it will be generated by the superposition these two inherently different industral geographies. The magnitude of distortions created by this superposition suggests that it does. And this shows the adequacy of theoretical insights discussed in the first chapter, pointing out to a bi-partite division of the intra-metropolitan industries.

Our conceptualization of the general industrial landscape as being generated by the superposition of two structurally different layers suggests that we can extract general conclusions from each layer separately. Thus, although a general industrial geographic study seems to be misleading it is quite possible to come up with general industrial geographies of small and large plants. Although such studies are likely to hide geographic variation, they may be relevant for students who pay little attention to spatial differentiation

4.6 General Industrial Geography of Small Plants within Greater Istanbul

We start with an overview on the frequency of vertices and with an analyis of the number and the strenght of linkages emanating from each one of the attributes. Figures 2.4.a to c show that the layer relative to small plants is generated by some 173 neighborhoods that are important in some industrial attributes (or in a combination of attributes). The frequency of attributes (vertices) and the number of linkages emanating from each one of them are shown in Table 4.3.

It is interesting to note that while the maximum difference in terms of attribute frequencies is about 55 %, the maximum difference in terms of links is in the order of 1 to 10. Diagram 4.3 (b) suggests that with only one link the attribute Uncovered area consitutes the most excentric attribute while with 10 links Covered Area stands out as being the center this particular network, followed by Workers and Technicians and with Administrative personnel with 9 and (8) links.

The industrial geography of small plants must be hidden in this quantitative and qualitative differentiation, yet it is to be discovered. But, no matter how we choose to describe this particular landscape, (verbally, graphically or mathematically), Diagram 4.3.(b) suggests that the attribute Covered Area must play a central role in the description and that Uncovered Area should have a minor role in the constitution of that particular landscape.

The establishment of a link depends upon the presence of a (positive) associative spatial relation between pairs of industrial attributes with a Gamma value exceeding .70.

Table 4.3 General Industrial Geography of Small Plants within Greater Istanbul: Distribution of Links by Areal Attributes and by Different Categories of Weight

Attributes

		Employment Characteristics					Land Use		Composition of Capital			
	N	Adm	W	MW	Tc	En	CA	VA	OF	Rv	Mc	Re**
Frequency												
Total Occurances	97	97	79	97	94	86	81	62	74	70	88	--
Associative *Weights*												
Category*1	0	0	1	1	0	0	0	0	0	0	0	--
Category 2	1	1	3	1	4	1	3	0	0	0	2	--
Category 3	1	4	1	2	2	0	2	0	1	2	2	--
Category 4	3	3	4	3	2	3	5	1	4	5	2	--
Total	5	8	8	7	8	4	10	1	5	7	6	--

Source : Derived from Figure 4.3.(b)

* Weight Categories are as defined in Table 4.1
** Real Estate Capital is (by definition) *not* an attribute of Small Plants

But an associative relation with a Gamma value exceeding .70 implies that the total number of cases placed on the main diagonal significantly exceeds the number of those cases on the minor diagonal. Notice also that if the cross products are equal we would obtain a Gamma value that is equal to zero. Hence in a two by two binary cross table T, a large gamma value can only be the generated in one of the following situations.

a. the frequency in T_{11} exceeds by far the frequency in case T_{22} (while none of the entries in the remaining three cases is equal to zero) (dominant co - absence of attributes)
b. the frequency in T_{22} exceeds by far the frequency in case T11 while none of the entries in the remaining cases is equal to zero) (dominant co-presence of attributes)
c. the cross product along the main diagonal $T_{11}.T_{22}$ exceeds by far the cross product along the minor diagonal $T_{12}.T_{21}$ (while none of the entries have a zero frequency.)

So, if we know that the crosstabulation of two binary attributes produces a fairly strong (positive) associative relation and the value of one of the attributes (considered as the (independent variable) 'our uncertainty' on the value of the dependent variable will be reduced.

This reduction of Uncertainty is measured through the Coefficient of Uncertainty derived from Information Theory. In the SPSS manual Uncertainty Coefficients are explained as follows:

The asymmetric coefficent of uncertainty when X is the independent variable and Y is the Dependent variable is;

$$\text{Uncertainty Coefficent} = \frac{U(Y) - U(Y|X)}{U(Y)}$$

where U(Y) represents the average uncertainty in the marginal distribution of Y and is calculated by;

$$U(Y) = - \sum_{j} p(Y_j).\ \log p\ (Y_i)$$

where $p(Y_j)$ stands for the probability of a particular category in Y or proportion of Y_j.
U(Y|X) stands for a conditional uncertainty of Y given X and is calculated by;

$$U(Y|X) = -\Sigma_{kj}\Sigma_{p}.(Y_j, X_k)\log p(Y_j|X_k)$$

Likewise, an asymmetric measure where X is the dependent variable can be defined as;

$$\text{Uncertainty Coefficent} = \frac{U(X) - U(X|Y)}{U(X)}$$

The maximum value for the uncertainty coefficient is 1.0, which denotes the complete elimination of uncertainty.. It is achieved when each category of the independent variable is associated with a single category on the dependent variable, when no improvement occurs, the uncertainty coefficient takes on the value of zero. This happens only when the dependent variable distribution of cases has exactly the same proportion within each category of the independent variable as it has in the total set of cases. That is, if the variable defining the rows is the dependent variable, then the column percentages for each column must be the same a the percentages of row totals.

It is evident that Asymmetric Uncertainty Coefficients are perfectly relevant for landscape analysis they will indicate the performance of attributes as a predictor of the remaining ones.

Uncertainty Coefficients will enable us to measure the predictive capability of every other attribute taken up. Asymmetric uncertainty coefficients associated with each link shown in Diagram 4.3(b) are produced in Table 4.4. Notice that Uncertainty Coefficients of missing links are low and shown in smaller characters.

Hence this matrix allows each attribute to act both as a dependent and independent attribute and shows the reduction of uncertainty in each case.

Table 4.4 Uncertainty Coefficients Derived for the Layer Relative to Small Plants

(General Industrial Geography of Small Plants) **

Independent Attributes ↓ | Dependent Attributes ↓

	N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re
N	*	,21	,26	,14	,12	.06	,12	.01	.05	.07	.10	--
Adm	,21	*	,31	,20	,29	,16	,19	.02	,18	,16	,16	--
W	,26	,31	*	,22	,22	,13	,18	.03	,14	,17	,26	--
MW	,14	,20	,31	*	,21	.07	,24	.02	.08	,16	,13	--
Tc	,12	,29	,22	,21	*	,27	,26	.04	,15	,16	,20	--
En	.06	,16	,13	.07	,27	*	,16	.05	.09	.10	.12	--
CA	,13	,20	,18	,24	,26	,16	*	,13	,14	,19	,23	--
UA	.01	.01	.03	.02	.04	.04	,13	*	.03	.03	.07	--
OF	.05	,18	,14	.08	,15	.09	,14	.03	*	,14	.11	--
Rv	.07	,15	,17	,15	,17	.09	,19	.03	,14	*	,18	--
Mc	.10	,16	,26	,13	,20	.12	,23	.07	.11	,18	*	--
Re	--	--	--	--	--	--	--	--	--	--	--	--

Source: Computed through SPSS from the Union of Figures. 2.4.a to 2.4.c.

These matrices of Uncertainty Coefficients [especially when they are used with descriptive diagrams depicting the strenght of the spatial association amongst pairs of industrial attributes] will enable students to extract many properties of ndustrial landscapes.

So, after all these data transformations, discussions on the geographical representativity, operations of slicing and analyses on sensitivity, we can derive a number of conclusions relative to the general industrial geography of small plants. But two difficulties prevent us from elaborating more on these conclusions.

The first and probably the most important stems from the simple fact that, because of spatial variation these coefficients are not geographically representative. As we are going to see in the following paragraphs, some results do not always hold true in each one of the three sides of the metropolitan area. As a consequence, in many cases these coefficients fail to convey an adequate account of the specificities.

Secondly, for the moment we do not have at our disposal a sound basis for assessing the importance of these results. However for those students who do not ascribe much attention to spatial variation we present a comparative analysis at the end of this paragraph. So these interim conclusions may at best serve to describe and compare in quantitative terms the predictive powers of attributes shown in **Figure 4.3 (b)**.

For the clarity of exposition our conclusions in the same order as they appear on Table 4.4 and in Figure 4.3 (b) (clockwise). These conclusions relate to small plants in the entire metropolitan area in the year 1988 and that they depend on explicitly stated individuals and slicing parameters.

We do not therefore have any claim on the generality of our conclusions. As we have already emphasized, some of them do not even hold true in all the parts of the metropolitan area. It may well be that subsequent to changes in the way small scale production is organized, future studies that use the same level of abstraction and individuation reveal totally different properties. Even, if this turns out to be the case, these conclusions would be of some importance since they will inform students on the very nature of the spatial transformation they are dealing with. For after all we need at least two structural representations to talk about spatial impacts of industrial restructuring processes. Subsequent to these cautionary notes let us summarize some features of this layer.

Probably one of the most striking feature of this industrial landscape stems from the fact that the attribute Uncovered Area do not, in any noticeable way reduce our uncertainty on other attributes except Covered Area. In other words the spatial organization of small scale industrial production, generates an industrial landscape in which information on the presence (absence) of the attribute Uncovered Production space do ***not*** contribute in any noticeable way to our understanding of other features of this landscape.

Notice that, because of apparent symmetry, the proposition is valid in the other way as well and attributes (other than the attribute Covered Area) do not inform us on the presence (absence) of Uncovered Area as an associated attribute. This of course does not imply that we do not have any cases in which Uncovered Area happens to be associated with other industrial attributes. But as we have an impressive counter evidence our conclusions cannot be generalized. Consider for instance the following crosstable relative to the distribution of these two areal attributes.

Table 4.5 Greater Istanbul; Layer Relative to Small Plants; (1988) Crosstable on the Distribution of Uncovered Area and (Concentration) in Terms of Number as two (Binary) Industrial Attributes of Places.

		Uncovered Area 0	Uncovered Area 1	Row Totals
Concentration in Terms of Number of of Plants	0	54	22	76
	1	57	40	97
Column Totals:		99	74	173

Source Derived from the Union of Figures 2.4 a to 2.4 c using SPSS

The Gamma index associated with this particular spatial relation is as low as .27 and as we have excluded linkages with Gamma values lower than .70 these two attributes are not connected in Figure 4.3 (b). Now the asymetric Uncertainity Coefficients of this table is .01192 when the attribute Number of Plants is considered as dependent and .01252 when the attribute Uncovered Area is considered as dependent. The asymmetric difference is negligeable. One can easily see that it makes no difference, whether the attribute Uncovered Area is predicted from known properties of the attribute Number of Plants or the attribute Number of Plants is predicted through known properties of the attribute Uncovered Area. The reduction of uncertainty associated with these predictions is in the order of 1 %.

In other words, these predictions are not informative. Thus, while these two attributes depict an associative spatial relation in no less than 54 % of the neighborhoods in this layer in 46 % of the cases they are in a dissociative relation.

When interpreted in industrial geographic terms, this result, illustrates the fact that the category small plants covers establishments with vertically disintegrated production structures, operating within horizontally integrated production complexes.

Figure 4.3 (b) suggests that there exists a weak association between Covered and Uncovered area and Table 4.4 suggests that Uncovered Area causes a reduction of uncertainty in the order of 12 percent. Relevant cross table shows that no less then 122 , out of a total of 173 neighborhoods depict an associative relation in terms of these attributes. But, as an overview on figures 2.4 a to 2.4 c would suggest, in most cases these attributes tend to be co-absent. These cases account for no less then 41 % and as one could easily expect are concentrated around the metropolitan center. When the entire layer relative to small plants is considered, the presence (absence) of the attribute Uncovered Area does not emerge as a pre-requisite of production.

As one may easily expect the same is not the case for Covered Area, which facilitates the decoding of this layer. Of course the magnitude of its contributions varies .

Covered Area is a powerful predictor of Master Workmen and Technicians and Machinery capital. To a lesser degree its distribution reduces our uncertainty on the distribution of attributes such as Administrative Personnel, Workers and Engineers and Revolving capital. Hence through its associations with all the remaining attributes and its performance as a predictor, Covered Area stands out as a key variable since its presence (absence) goes hand in hand with the presence (absence) of all other attributes.

It is interesting to see that no other attribute, such a wide power of description. In other words students can simply not ignore the fact that its presence generally goes hand in hand with the presence of all other factors of industrial production. Recall that this was not the case with Uncovered Area. In this sense we can say that the attribute Uncovered production space plays a marginal role in the constitution of this particular industrial geography, and the attribute Covered Area emerges as one of the pillars of the industrial landscape of small scale industrial production in Istanbul.

Uncertainty coefficients among employment categories are generally high, notice however that the link between Engineers and Master Workmen is missing. The missing link seems to be one of the most important features of this landscape. We are going to see that the missing link is one of the few geographical constants of the industrial landscape small plants. In other words not only these two categories show a very weak associative spatial relation in the general metropolitan landscape, they do so in each one of the three sides of the metropolitan area.

Uncertainty coefficients derived for areal associations among different categories of labor and capital suggest, rather low levels of reduction of uncertainty. The highest are between Workers and different items of capital. But the strong spatial variation suggests that in themselves these general measures do not constitute relevant, reliable, and representative accounts of the reduction of uncertainty. In other words these overall indices of reduction of uncertainty can not be taken at their face value as need to be geographically disaggregated.

Finally Uncertainty Coefficients among different categories of capital are not very high. Although these indices are subject to strong spatial variation it is possible to say that in this landscape spatial associations amongst different categories of industrial capital are generally not as informative and strong as it was the case amongst employment categories. We are going to see that the layer relative to large scale plant is endowed with noticeably different features. So these features of small scale plants provide us with points of reference and with a comparative basis. We conclude with a brief recapitulation.

1. The attribute Uncovered Area plays a marginal role in this landscape and do not arise as a prerequisite of small scale industrial production.

2. The opposite is true for the attribute Covered Area which emerges as one of the key elements of this landscape. Thus a relevant study on the spatial structure of small scale production must carefully 'unpack' this heavily loaded areal attribute. We must point out that both local industrial histories and the recently formulated intra-metropolitan industrial location theory provide a theoretical basis and empirical evidence on this very issue.

3. As distinct from the layer relative to the total plant population, the attribute Number of Plants is connected with some of the remaining attributes. It is important to note that the latter reduces uncertainty with respect to all categories of employment and Covered Area.

4. Uncertainty Coefficients among employment categories show that only four of a total of 20 do not cause significant reductions of Uncertainty in predicting others. These weak spatial associations are observed between Engineers and Workers and Engineers and Master Workmen.

4.6.1 Dominant Industrial Geographic Features of the Layer Relative to Large Plants.

This paragraph attempts to illustrate that our previous analyses on the dominant features of the industrial geography of small plants are not only informative in extracting specific characateristics of one of the layers, which, were bound to remain hidden in general studies, but they do provide us with a sound comparative basis, that facilitates the interpretation of the industrial geography of large plants.

It is presented in same order as above in the same order as above. In the first part, we concentrate on vertex frequencies and present an comparative analysis on the connectivity pattern and vertex specific distribution of links shown in Diagram 4.3.(a). This introductory comparative analysis is then followed by an overview on uncertainty coefficients associated with this layer. In the final step we present a preliminary comparative industrial landscape analysis in which dominant structural features of these two layers are discussed.

But, as we are going to see in the following paragraphs and as we have seen in our previous analyses on general industrial landscapes,there is a strong spatial variation in index values including uncertainty coefficients. Being concerned with the geographical relevance and representativity of our results we have been cautious and reserved in our conclusions and have been reticent to derive general conclusions. But even though geographical disaggregation brings in differences of degree (in terms of the hierarchical position of links) and of kind (some links are observed in certain sides and not in others), in each case these two layers present non negligeable dissimilarities. So our preliminary conclusions are tentative and are subject to geographic variation as indices upon which they are based. At best they can be considered as an overall account of dissimilarities and discrepancies between these two layers.

The distribution of links shown in Figure 4.3.(a) are summarized in Table 4.6.

Table 4.6 General Industrial Geography of Small and Large Plants within Greater Istanbul: Distribution of Links by Areal Attributes and by Weight Categories

				N	Employment Characteristics: Adm	W	MW	Tc	En	Land Use: CA	UA	Composition of Capital: OF	Rv	Mc	Re**	
Frequency																
Total Number of Occurances	(s)			97	97	79	97	94	86	81	62	74	70	88	--	
	(l)			92	81	75	78	78	75	88	60	58	60	66	73	
Associative *Weights*																
Category* 1	(s)			0	1	1	0	0	0	0	0	0	0	0	--	2/2 = 1
	(l)			0	3	4	1	0	2	0	0	4	2	6	2	24/2 = 12
Category 2	(s)			1	1	4	2	4	1	3	0	0	0	2	--	18/2 = 9
	(l)			0	4	4	1	2	4	3	1	3	2	1	3	28/2 = 14
Category 3	(s)			1	4	0	2	2	0	2	0	1	2	2	--	16/2 = 8
	(l)			0	1	1	5	7	2	3	0	2	3	1	3	28/2 = 14
Category 4	(s)			3	3	4	3	3	3	5	1	4	5	2	--	36/2 = 18
	(l)			0	2	1	2	0	2	4	6	1	2	2	2	24/2 = 12
Totals	(s)			5	9	9	7	9	4	10	1	5	7	6	--	72/2 = 36
	(l)			0	10	10	9	9	10	10	7	10	9	10	10	104/2 = 52

Source ; Derived from Diagram 4.3.(b)

* Weight Categories are as defined in Table 4.1
** Real Estate Capital is (by definition) *not* an attribute of Small Plants

(s) Denotes the layer relative to *small* plants
(l) Denotes the layer relative to *large* plants

We are going to see that this table does, little more than to illustrate the structural contrast between representations of these two inherently different industrial geographies. But before any further elaboration it would be convenient to elucidate what we mean by the phrase structural contrast in the first place.

If the trivial difference pertaining to the spatial frequency of the attribute Real Estate Capital is set aside (which stems directly from the definition of the category small plants) the layer relative to large plants depicts lower frequencies in each and every attrituse. This surely is not a coincidence, since the 12 dimensional scanning procedure that we have made use of detects only 146 simplices (neighborhoods) as being *important* in one or a combination of industrial attributes. The same procedure run in small plants category generates a landscape made of no less then 173 simplices (neighborhoods). An overview on relevant simplex Diagram suggests that the difference stems mostly from the exclusion of neighborhoods in and around the metropolitan center in Beyoglu and Istanbul sides (up to 5th kilometer). Hence, while the layer relative to small plants includes no less then 49 neighborhoods of this sector only 16 of them are included in the layer relative to large plants. The difference in terms of total number of neighborhoods is approximately equal to the total number of neighborhoods excluded in this sector. It follows that the layer relative to large plants generates an overall account of the production space from Sarıyer to Silivri and from Silivri to Gebze in which neighborhoods around the metropolitan center are significantly under represented.

On the other hand, if we calculate for illustrative purposes the average number of industrial attributes per neighborhood, excluding of course the attribute Real Estate Capital for obvious reasons pertaining to comparability, we see that the difference is, for all practical purposes, negligeable. The average number of attributes per simplex is 5.3 in small plants and 5.5 large plants categories. This clearly illustrates the fact that analyses on the layer for large plants are not carried out in a landscape that is significantly richer in terms of industrial attributes. Thus the difference we have observed between the graphical representations of general industrial geographies of small and large plants (recall Figures 4.3 (a) and 4.3 (b) do not stem from the fact that the latter is significantly rich in industrial attributes. The use of group specific slicing parameter vectors apparently eliminates this distortion effect.

But if (on the average) we have approximately similar number of attributes per neighborhood and totally different representations of industrial landscapes (as they are revealed through areal associations in Figures 4.3 (a) and (b) how are we going to account for this discrepancy ?

If we recall that latter diagrams are based on Gamma indices which in their turn measure the strenght of the areal association among different factors of industrial production one can easily and convincingly illustrate the fact that this discrepancy stems from structural differences in the mode of spatial organization of production factors in each layer.

Consider for instance the attribute pair Engineer - Uncovered Area in both layers. These two attributes are disconnected in the layer relative to small plants as they do not exhibit (at this explicitly stated abstraction level) a particularly strong areal association. (See: Figure 4.3 (b)) The Gamma index of this association is as low as 0.48. They are linked, however, in Figure 4.3 (a) which relate to large plants category since the Gamma index of this particular areal association is significantly higher 0.794688. (Notice that the strenght of the association is very close to the threshold level for Category 3). But Table 4.6 suggests the number of neighborhoods endowed with these attributes is higher in small plants category. As opposed to 75 neighborhoods endowed with the attribute Engineers in large plants category we have 86 such neighborhoods in small plants category. It is also interesting to see that in the layer relative to small plants no less then 62 neighborhoods are important in terms of Uncovered Area as opposed to 60 in the layer relative to large plants.

The missing link in Figure 4.3 (b) suggests, therefore, a particular spatial distribution of production factors which makes that the two attributes, even though they are at least as numerous as their counterparts in large plants, do not reveal an associative relation as it is the case in the latter category. (see Figure 4.3 (a)). Hence if a link is present in one layer but missing in the other, may signal significant differences in the spatial mode of organization in terms of related attribute pairs, since as we have just seen, the presence of a link is mostly independent of the overall frequency of attributes. This clearly shows that, even if

Figures 4.3 (a) and (b) are compared with a descriptive index as crude and superficial as 'The Number of Connections', one must conclude that an inherently different modality in the spatial organization of production factors is at stake especially if it is compared with the layer relative to small plants. It is believed the 16 additional areal associations that are necessary for the description of this particular spatial organization of production factors, in itself, justifies both our conceptualization of these two layers as depicting two distinct industrial geographies and phrases in which the word geography is used in plural.

But a closer scrutiny suggests that the contrast between these two industrial geographies can not possibly be reduced to differences in terms of number of links. The problem seems to be much more complicated than this. The industrial geography of small plants can not be considered as a subset of the industrial geography of large plants since in its turn it comprises no less than 5 links that are not represented in Figure 4.3 (a). It follows that there exist only 13 links that are common both layers, more often than not they belong to different categories in terms of the strenght of the areal association. Thus there exist non negligeable quantitative differences in terms of the strenght of areal association as well. But following attributes are depict similarities in terms of the strenght of the areal association;

Attribute Pairs	Type of the Association
Adm - W*	
W - Tc	
MW - Tc	→ [Labor - Labor]
Tc - En	
MW - Rv	
MW - Mc	→ [Labor - Capital]
Tc - Mc	
En - CA	→ [Labor - Land Use]
CA - Mc	→ [Land Use - Capital]

On the other hand in spite of all discrepancies it is rather interesting to see that all of the three links that are missing in Figure 4.3 (a) are also missing in Figure 4.3 (b). These relate to the following attribute pairs

MW - UA	
	→ [Labor - Land Use]
Tc - UA	
UA - Rv	→ [Land Use - Capital]

How are we going to interpret these similarities ? For while dissimilarities could be interpreted as being spatial manifestations of inherently different factor endowments and modes of spatial organisations of industrial production, the same argument would not hold true in case of these apparently surprising similarities. Comparative landscape analysis should concentrate on dissimilarities as well as similarities.

But as the following paragraphs clearly indicate and as we have already seen in our analyses on general industrial landscapes of greater Istanbul one should be extremely reluctant to derive conclusions unless the distortion effect stemming from geographical aggregation is filtered off. In other words those similarities are relevant to the extent they resist geographical disaggregation. But if they are subject to strong spatial variation they can hardly be taken at their face value, for in that case they would represent not the category of plants for which they are derived but a combination of factor deployment patterns in each category.

On the other hand, some similarities are superficial. Recall that Administrative Personnel is extremely noisy in small plants category as it tends to mix up (because of the ambiguity in Turkish) clerical workers with shop owners. So this similarity is superficial and can not be taken too seriously.

Similarly, the weak associative relation between Master Workmen and Revolving and Machinery capitals, to some extent resists geographical disaggregation in Istanbul and to some extent on Anatolian sides but not on the Beyoglu side they stand in a highly associative relation with respect to one another in both layers. See Figures 4.5 (a) and (b).

So, although we have detected a number of similarities it would be too hasty to derive conclusions unless this geographical distortion is effect is filtered off.

To end this section on attribute frequencies, similarities and dissimilarities in the hierarchy of links, it must be emphasized that the identification of attributes that play a central role in the constitution of this particular landscape is not as easy as it was in the case before. Notice that out of a total of 12 attributes taken into account no less then 7 are 10-connected and 3 are 9-connected while one attribute (N) is totally disconnected from the rest of the network. Only one attribute (Uncovered Area) has 6 connections with the rest of the network.

It is therefore quite normal for this quasi perfect connectivity pattern to leave no room for the expression of the specific characteristics of the industrial geography of small plants. The only attribute through which small plants may impact general industrial geography is of course N. But it seems that the only channel that is left open to express its specificity is blocked under the overwhelming weight of large plants in terms of other factor intensities. (See Figure 4.1).

Thus although it is easy to see that this particular layer is quite different than the layer relative to small plants it is not easy to extract its dominant properties. For it is one thing to detect structural dissimilarty and quite another to produce a plausible account. Analysts will not be properly guided by this quasi interconnected industrial geographic organization, in which most of the areal attributes are areally associated with every other. However Uncovered Area and Number of Plants show noticeable spatial variation in their connectivity pattern with the rest of attributes. As one could expect, if these two attributes are set aside, it becomes extremely difficult to interpret the matrix of asymetric uncertainty coefficients associated with this particular industrial geography (see Table 4.7). The attribute relative to concentration of plants in terms of numbers [N] has undoubtedly the worst performance in terms of reduction of uncertainty.

This low predictive performance stems from two obvious sources. the unconventional definition of large plants which leaves a number of small plants operating in owned premises which in their turn generate 18 simplices that are important in terms of number of plants only. The second and probably more important factor is that, large plants are on the whole much more evenly distributed as compared to small plants.

Uncovered area, is the second and probably more important attribute. We have seen that in the category small plants it reduced uncertainty in no other attribute except Covered area. It is endowed with significantly higher predictive powers here. It is probably not surprising to see that amongst different categories of labor it is an acceptable predictor of Engineers and Administrative Personnel and it is adequately predicted through these attributes. It also reduces the level of uncertainty for the distribution of Machinery by 17 % .

Table 4.7 Uncertainty Coefficients Derived for the Layer Relative to Large Plants

Independent Attributes ↓ / Dependent Attributes ↓

	N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re
N	*	.01	.02	.03	.00	.00	.01	.00	.00	.00	.00	.01
Adm	.02	*	.51	.28	.20	.27	.18	.15	.29	.25	.31	.31
W	.02	.51	*	.37	.25	.36	.19	.14	.26	.28	.32	.36
MW	.03	.28	.37	*	.19	.21	.22	.12	.20	.13	.16	.21
Tc	.00	.20	.25	.19	*	.25	.20	.12	.18	.20	.21	.21
En	.00	.20	.36	.19	.25	*	.17	.18	.23	.20	.35	.28
CA	.01	.18	.19	.22	.19	.17	*	.24	.20	.14	.21	.13
UA	.00	.15	.13	.11	.11	.17	.24	*	.12	.09	.17	.14
OF	.00	.28	.25	.20	.18	.22	.20	.12	*	.31	.35	.30
Rv	.00	.24	.24	.13	.19	.20	.14	.09	.31	*	.39	.21
Mc	.00	.31	.32	.16	.21	.35	.21	.17	.36	.39	*	.31
Re	.00	.27	.36	.21	.21	.27	.14	.15	.31	.22	.32	*

Source: Computed through SPSS from the Union of Simplex Diagrams 2.5.a to c

4.7 Industrial Geographies of Istanbul Side

Previous analyses which depended on geographic or economic disaggregation did not yield penetrating insights. We need both type disaggregaton to be implemented simultaneously. In the next three paragraphs we will proceed in accordance to our own methodological conclusions and attempt to derive conclusions that are hopefully wider in scope. It is evident that if jointly implemented geographic and economic disaggregations will enable us to eliminate noises stemming from the superposition of inherently different spatial production factor deployment patterns.

Although in the particular case of Greater Istanbul these superpositions reduce the geographic and economic representativity of our indices we did not elaborate on the causes of these distortions. But as we will reduce the scale of our analyses and concentrate of specific industrial geographies of each one of the three sides of the metropolitan area, it will be necessary to start with a summary on the dominant industrial geographic characteristics of each one of these sides. In these summaries we will make extensive use of data and preliminary insights derived from our quantitative exploratory study. In this regard the quantitative study and insights it provides constitute the external data base upon which our interpretative text is constructed (as suggested by Johnson's Star Theory programme) Johnson (1991).

Subsequent to these brief summaries on the industrial geographic properties of each side of the metropolitan area we will provide the reader with a;

a. a diagrammatical representation of areal associations in the matrix of Gamma Indices and an analysis of the pattern of connectivities

b. a matrix of asymetric uncertainty coefficients.

As we have two categories of plants the industrial geographic analysis of each side will require the presentation of two matrices (one for each category of plants) and two diagrammes. However following discussion suggests that for the facility of interpretation it is preferable to use two different landscape descriptions derived through different slicing parameter vectors. So our presentation includes these alternative descriptive accounts.

At the end of each paragraph we will provide a summary of interim conclusions.

4.8 An Overview on the Industrial Geography of Istanbul Side.

Centrographic analyses produced in our exploratory quantitative exploratory study, clearly show that the Istanbul side of the metropolitan area is fully or partially specialized in trades such as ;

Plastics and Plastic Goods

Printing and Publishing

Metallic Hand Tools

Women's and Men's Garment Industry

Leather and Furs (Garment Industry)

Leather Tanning

Leather Goods

Spinning and Wéaving

Electrical Household Appliances

This study also indicates that the most capital intensive trade in which Istanbul Side is found to be specialized in, is the Plastics industry, and that it ranks 10^{th} in terms of capital intensity among 36 trades (which cover approximately the entire universe of commodity production as defined through SIC codes. Notice also that the latter is followed by Printing and Publishing which ranks 25^{th} in terms of capital intensity. Being the core for all these labor trades Istanbul side depicts noticeable industrial concentrations the most important being the Zeytinburnu, Maltepe, Bayrampaşa Topçular complex.

Spatial lorenz curves produced in our exploratory study suggest that this side (together with the Beyoglu side) has the most concentrated factor deployment patterns. In fact the sector up to 20^{th} kilometer includes no less than 87 % of total industrial capital and 92 % of total industrial employment and 95 % of industrial establishments. On the other hand the sector up to 15^{th} kilometers accounts for no less than 80 % of total capital, 85 % of total industrial employment and 90 % of all plants. Notice that these results are perfectly consistent with theoretical insights one can derive from Scott's intra-metropolitan industrial location theory which suggest concentrated distribution patterns for labor intensive trades. These percentages are similar to those observed on the Beyoglu side specialized also in labor intensive trades and quite dissimilar to those observed on the Anatolian side which has a capital intensive productive base.

Finally, our exploratory study shows that because of the concentration of labor intensive trades, population and industrial decentralization unfold paralelly and that the distance between the center of gravity of population distribution is located very close to the center of gravity of the distribution of capital and labor.

These notes show that the following qualitative analyses relate to a particular landscape in which layers from relatively labor intensive trades are superposed. In brief the industrial geographic analysis of the Istanbul will reveal certain properties of a labor intensive production space. As small and large plants are analyzed separately our study can can be considered as an exercice of decomposition of Figure 4.2 according to scales. Similarly this exercice attempts to introduce geographical specification on layers derived for small and large scale establishments. (Figure 4.3 (a) and 4.3 (b)).

Geographically and economically specified analyses summarized in this paragraph enable us to see a better general picture of the labor intensive industrial landscapes of the Istanbul side.

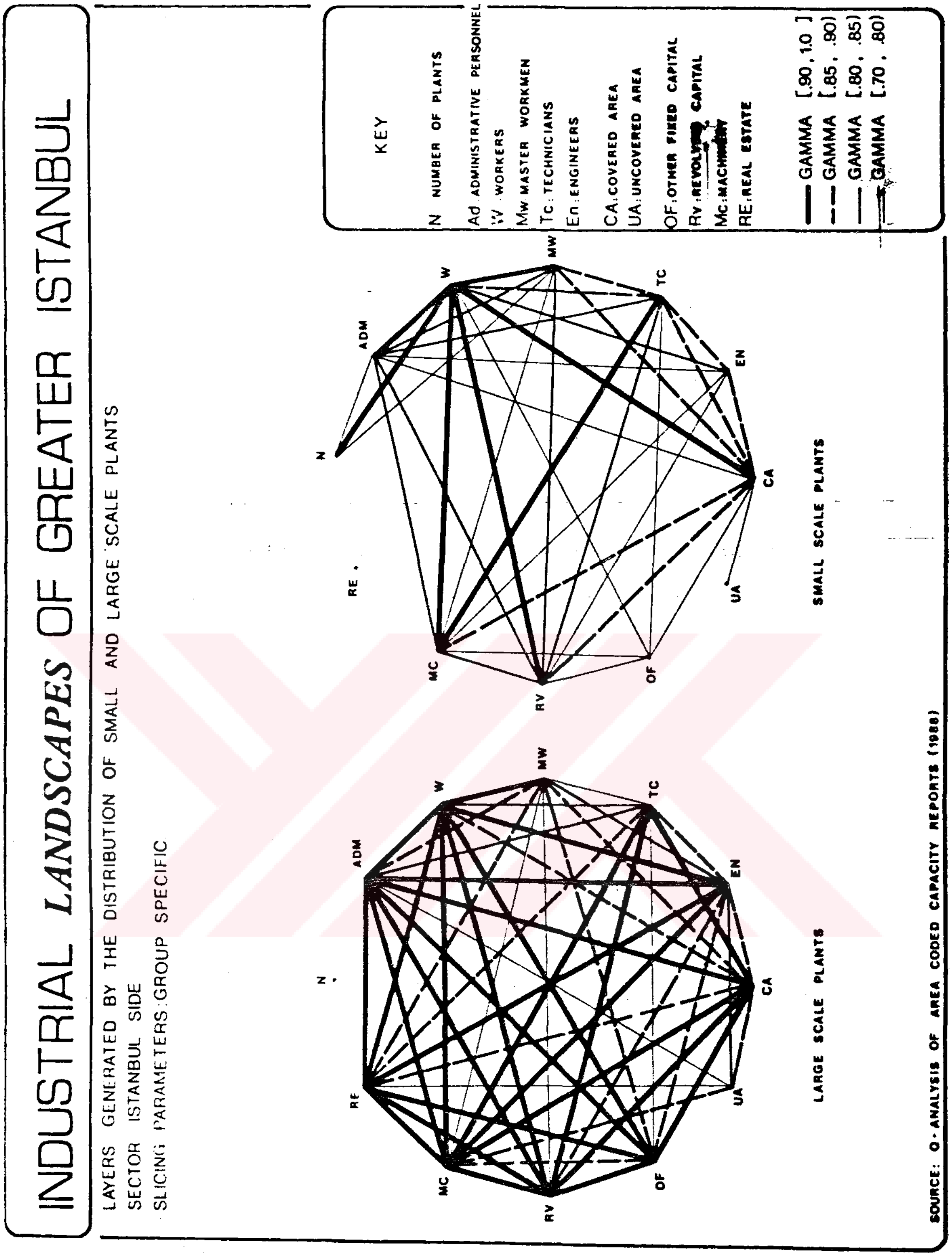


Figure 4.4 (a-b) Istanbul Side: Spatial Associations among Attributes in Large (a) and Small Plants (b) Slicing Parameters: Group Specific.

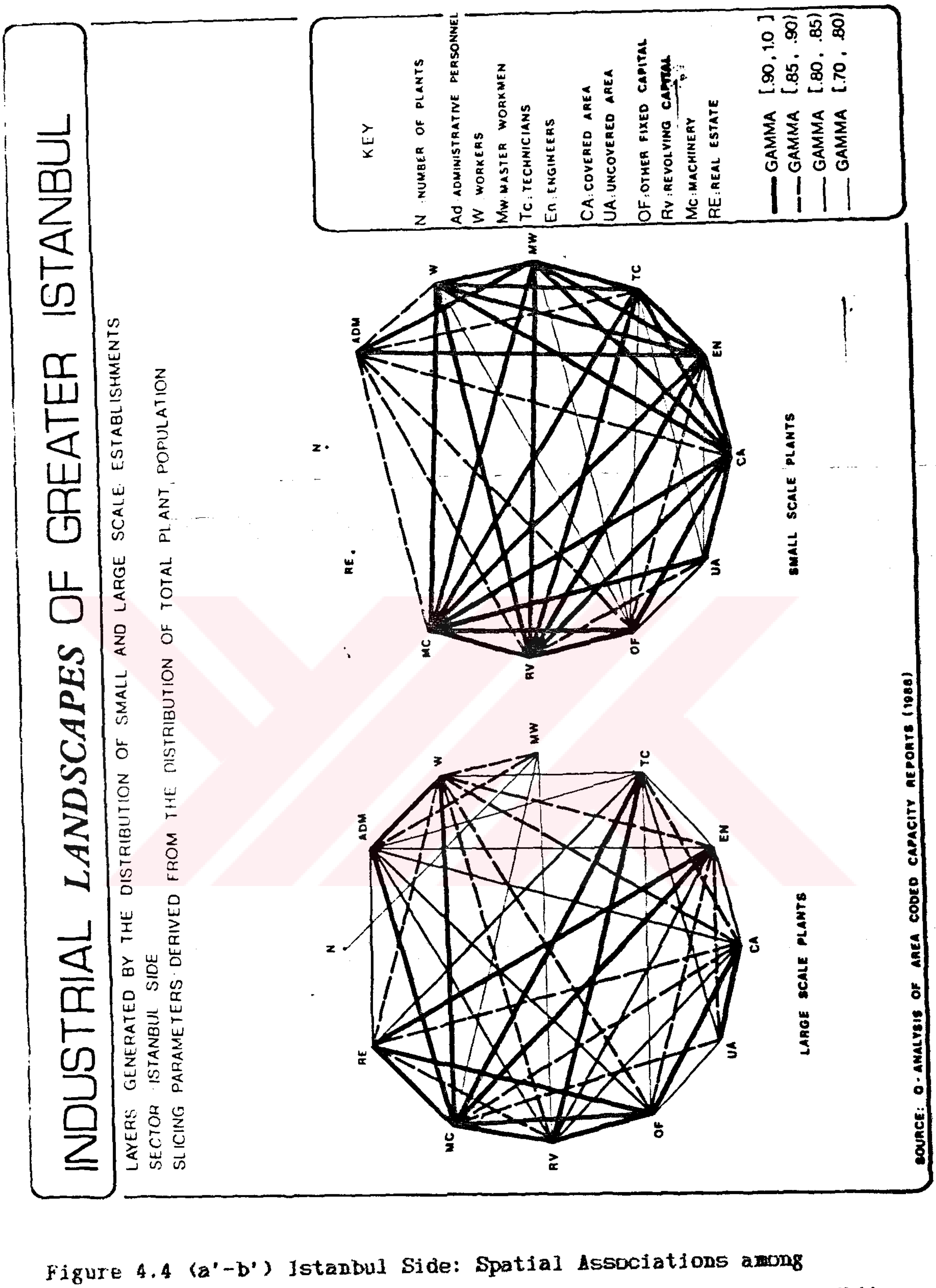


Figure 4.4 (a'-b') Istanbul Side: Spatial Associations among Attributes in Large (a') and Small Plants (b') Slicing Parameters: General

4.9 Istanbul Side: Industrial Geographic Properties of the Layer Generated by the Spatial Distribution of Large Scale Plants. (As they are revealed through group specific and general slicing parameter vectors).

As the contrast between Figures 4.4.a and 4.4.a' and Table 4.8 clearly indicate we have to specify above all the scale of our analysis. For, it is evident that interpretations based on Figure 4.4.a can hardly coincide with those derived from Figure 4.4.a'. Here we are going to show that in this particular case it is much more relevant to use the representation associated with slicing parameters derived from the total plant population. The argument proceeds in the following way.

Slicing parameters derived for the total plant population cause noticeable increases the level of eligibility in each attribute in small plants category. Table 3.1 indicates that general slicing parameters are equal to or are slightly higher in labor categories. On the other hand, group specific slicing parameters are, -as compared to those derived from the total plant population- slightly higher in different categories of industrial capital. Differences in the strenght of areal associations in Figures 4.4.a and 4.4.a' can be considered as stemming from differences in slicing parameters used for N. The only attribute that shows significant variation is N (concentration in terms of number of plants) and it is not connected to the rest of the network in both representations. These differences are summarized in Table 4.8

Table 4.8 Istanbul Side; Comparison of the Distribution Patterns of of Links by Areal Attributes and by Different Categories of Associative Weights in two Different Representations of the Industrial Geography of LargePlants.

Attributes

	N	Employment Characteristics					Land Use		Composition of Capital				
		Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re**	
Frequency													
Total Number of Occurance													
(lc)	47	38	35	38	31	30	36	26	27	31	31	35	
(lg)	24	34	31	31	31	30	35	26	25	30	32	44	
Associative *Weights*													
Category*1													
(lc)	0	7	7	1	3	4	5	0	5	7	7	6	52/2 = 26
(lg)	0	2	2	0	2	2	2	1	4	3	7	3	28/2 = 14
Category 2													
(lc)	0	1	1	4	2	4	5	2	3	1	2	3	28/2 = 14
(lg)	0	1	6	2	1	3	4	2	2	2	2	3	28/2 = 14
Category 3													
(lc)	0	1	1	1	2	2	0	1	0	0	0	0	8/2 = 4
(lg)	0	5	1	0	2	3	3	1	1	3	0	1	20/2 = 10
Category 4													
(lc)	0	1	1	3	2	0	0	2	1	1	1	1	12/2 = 6
(lg)	1	1	0	3	3	1	0	1	2	1	1	0	14/2 = 4
Totals													
(lc)	0	10	10	9	9	10	10	5	9	9	10	9	100/2 = 50
(lg)	1	9	9	5	8	9	9	5	9	9	10	7	88/2 = 45

Source : Derived from Figures 4,4,(a) and 4,4 (a')

* Weight Categories are as defined in Table 4,1

(lc) Connectivities in the layer relative to *large plants* located on the *Istanbul* Side According to Category Specific slicing parameters

(lg) Connectivities in the layer relative to *large plants* located on the *Istanbul* Side According to slicing parameters derived from the ditribution of total plant population.

Why ? We have time and again illustrated the unusually high (macro level) discriminatory power of the attribute pertaining to the type of tenure under which plants and premises are held. But this in no way constitutes a guarantee that its performance will be as satisfactory at micro levels. For such a conclusion one needs to show that all large scale plants operate in owned premises and all small plants operate in rented premises. It is evident that neither of these two propositions are true. Thus our unconventional discriminator leaves a residue in both categories. At macro levels these misallocated cases may generate distortions.

One can easily see that the representation of the industrial landscape of Istanbul Side obtained through group specific slicing parameters includes this distortion as it includes no less than 14 neighborhoods that are important in terms of Number of Plants only. For all practical purposes these cases can be considered as reflecting concentrations of small scale producers left as a residue in the category Large plants.

Now, if we recall that our interpretations are based on associative relations in which ***spatial co-absence*** of a pair of attributes is considered of equal importance as their ***co-existence***, it becomes evident that the higher is the number of neighborhoods in which a pair of attributes happen to be simultaneously absent, the higher will be the strenght of the associative spatial relation between them. But, one can easily see from Figure 2.5.a that this is exactly what happens when group specific slicing parameters are used. And this is ***the*** major reason why Figure 4.4.a comprises a relatively high number of high order links as compared to Figure 4.4.a'. In other words local concentrations of those misallocated small plants cause superficial increases in the strenght of areal associations.

Figure 2.3.a suggests that the application of the slicing parameter vector derived from the total plant population enables us to get rid of this effect as it has a higher slicing parameter for the attribute Number of plants. Although other slicing parameters undergo changes, the contrast (Guvenç 1992: 139) between small and large scale plants in terms of other factor endowments is such that a major part of this distortion can be ascribed to unexpectedly high number of cases that are important in terms of Plants only.

General slicing parameter vector is useful in that it eliminates 86 % of these neighborhoods without causing significant changes in the pattern of connectivities. Hence our analyses should be based on the representation produced in Figure 4.4.a' and not on that in Figure 4.4.a. in which the strenght of areal associations is superficially high. We are going to see that the reverse is true for small plants category.

It would be convenient to start our landscape analysis with an overview on the specificity of Istanbul side. The representation of the industrial landscape derived from the distribution of large plants (see Figure 4.3.a') will be used basis for this comparative study.

A comparison of these two representations suggest that connectivity patterns are similar. Thus the connectivity pattern observed on the Istanbul side is not unique and has non-negligeable structural similarities to the general pattern. However a closer scrutiny shows that there exist important discrepancies in the strenght of areal associations. These dissimilarities are summarized in Table 4.9 in the usual format.

Table 4.9 Comparison of the Distribution Patterns of Links by Areal Attributes and by Different Categories of Associative Weights in the Metropolitan Distribution of Large Scale Plants and in their Distribution on the Istanbul Side

		Attributes											
		Employment Characteristics					Land Use		Composition of Capital				
	N	Adm	W	MW	Tc	En	CA	UA	DF	Rv	Mc	Re**	
Frequency													
Total Number of Occurance													
(Lg)	39	79	68	67	78	75	88	69	61	63	76	92	
(lg)	24	34	31	31	31	30	35	26	25	30	32	44	
Associative *Weights*													
Category*1													
(Lg)	0	1	1	0	0	1	1	1	0	1	3	1	10/2 = 5
(lg)	0	2	2	0	2	2	2	1	4	3	7	3	28/2 = 14
Category 2													
(Lg)	0	1	3	3	0	0	2	0	2	2	2	1	16/2 = 8
(lg)	0	1	6	2	1	3	4	2	2	2	2	3	28/2 = 14
Category 3													
(Lg)	2	3	2	1	3	2	2	0	1	2	2	2	22/2 = 11
(lg)	0	5	1	0	2	3	3	1	1	3	0	1	20/2 = 10
Category 4													
(Lg)	0	3	3	5	3	7	4	3	6	3	3	4	44/2 = 22
(lg)	1	1	0	3	3	1	0	1	2	1	1	0	12/2 = 6
Totals													
(Lg)	2	8	9	9	6	10	9	4	9	8	10	8	92/2 = 46
(lg)	1	9	9	5	8	9	9	5	9	9	10	7	90/2 = 45

Source : Derived from Figures 4,3,(a') and 4,4 (a')

* Weight Categories are as defined in Table 4,1

(Lg) Connectivities in the layer relative to *large plants* located on Greater *Istanbul* (including Istanbul Side) (Figure 4,3,a') According to slicing parameters derived from the distribution of total plant population,

(lg) Connectivities in the layer relative to *large plants* located on the *Istanbul* Side (Figure According to slicing parameters derived from the distribution of total plant population,4,4,a')

Let us now concentrate on these similarities and dissimilarities. On the whole the connectivity pattern obseved on the Istanbul side is not significantly different than the pattern observed on the entire metropolitan area. In fact a opposed to 46 links that constitute the landscape description at the metropolitan level we need no less than 44 for Istanbul Side. On the other hand if the sharp contrast in terms of associative links with the category Master Workmen is set aside, Table 4.9 suggests that there is similarity in terms of number of links orginating from each attribute. But these similarities are not very instructive in that they do not take the strenght of the associative relation into account. However, the analysis of the distribution of links according to the intensity of the associative relation suggests a completely different story. We see for instance that in the overall representation of the large scale production space (which includes Istanbul Side) lowest order links (Category 3 and 4) account for no less then 72 % of the network while they account for only 36 % of the representation of the Istanbul Side.

These percentages get reversed when we consider highest order links. Table 4.9 shows that no less than 64 % of the diagram for Istanbul Side is made of highest order links with (.85 < γ < 1.0) while the same account for only 36 % of the overall representation. (Compare; Figures 4.4.a' and 4.3.a').

It follows that if we are to understand the specific general industrial geographic characteristics of Istanbul side we have to concentrate on those factors which generate such discrepancies in the intensity of areal association among different attributes. In other words we have to ask ourselves questions such as; why is it so that as compared to the overall representation we have so many high order links to represent the industrial landscape of the Istanbul side ? Or if we approach the problem other way round we may pose questions such as : why is it so that as compared to the representation derived for Istanbul Side we need so many low order links to represent the large scale industrial landscape of Greater Istanbul" ?

Recall that incidence matrix used in the description of the general large scale industrial landscape is made up from the union of three subsets each depicting the situation in one of the three sides of the metropolitan area. Such a discrepancy would not be possible at all, if contributions did not reduce the intensity of areal associations observed on the Istanbul Side. In other words if attributes showed a similar spatial relation the general picture would not depict such a discrepancy. The contrast between general and local descriptions reflect inherently different structural contributions. In other words, a sharp discrepancy would not emerge if (at least) two of the three sides of greater Istanbul did not have inherently different production factor deployment patterns (ie. industrial geographies).

No matter how we decide to account for these discrepancies, it is evident that the implications of the explanatory scheme should hold true on the remaining two sides as well.

Following paragraphs convincingly illustrate that this discrepancy stems directly from the specialization of the eastern and western sides of the metropolitan area in labor and capital intensive trades, that the comparatively high percentage of high order links observed on the Istanbul side is a spatial manifestation of an industrial organization generated by the concentration of large scale labour intensive establishments. The analysis shows that the dominant features industrial landscape observed on the Istanbul side can be taken up as spatial manifestations of production factor deployment patterns from a variety of labour intensive trades which tend to gravitate around the center of gravity of their respective labour pools.

In brief, the industrial landscape of the Istanbul side is a labour intensive landscape.

But, if this line of argument is correct, the pattern of areal association observed on the industrial landscape of Istanbul side should be very similar to the one observed on the Beyoglu side, the bulk of the plant population of which consists mainly of small scale labour intensive establishments. On the contrary, we should expect a totally different connectivity pattern and distribution of intensities on the Anatolian side, which, as our exploratory study convincingly illustrates, is specialized in capital intensive industries.

Differences and similarities documented in the following two paragraphs suggest that it is in fact the case and that the industrial landscape of the Istanbul side is a living example of a labour intensive industrial landscape. Two important consequences need to be discussed prior to any further analysis on particularities.

First, it is encouraging to see that the proposed analytical procedure is capable to detect and discriminate between similarities and dissimilarities that exist between the spatial reflections (manifestations) of labor and capital intensive organizations of capitalist industrial production.

Secondly the bi-partite division in the metropolitan area with labor and capital intensive industrial landscapes on each side of the Bosphorus plays havoc with the representativity of any attempt to come up with a general, economical, descriptive account of these two different types of production factor deployment patterns. It is therefore quite normal for a general overall picture such as Figure 4.3 (a') to produce (under the influence of the labor intensive landscape of the Istanbul side) a significantly amplified account of the strenght of the areal associations observed on the capital intensive industrial landscape of the Anatolian side. Notice also that, being but a mixture of labor and capital intensive industrial landscapes of the western and eastern sides of the metropolitan area, the overall picture of the industrial landscape (4.3 (a')) significantly reduces the strenght of the areal associations observed on the labor intensive sector of the metropolitan production space.

4.10 Industrial Geography of Small Scale Plants on the Istanbul Side

As previously we start with a comparative analysis in which, structural features derived from general incidence matrices of small plants are related to those observed on the Istanbul side. But, as we have at our disposal two different representations a choice is to be made.

But, as the following discussion illustrates, different sets of slicing parameters shed light on different aspects of the phenomenon and this without causing disproportioned distortions in gamma indices. We start with a study in which, two landscape descriptions derived for Istanbul side are compared with those derived for the entire metropolitan area. Differences between Figures 4.3 (b) and 4.4 (b) are summarized in Table 4.10 and those between Figures 4.4.b' and 4.3.b' in Table 4.11. Comparisons produced in Table 4.10 are based upon slicing parameters extracted from the total plant population and those produced in Table 4.11 are based on category specific slicing parameters. When slicing parameters extracted from the distribution of total plant population are used. the industrial geography of small plants observed on the Istanbul Side is not significantly different than that observed at the metropolitan level.

Table 4.10 A Comparison of Linkage Patterns in the Metropolitan General and Local (Istanbul Side) Representations of the Industrial Geography of Small Plants. Slicing Parameters: General

Attributes

		N	Employment Characteristics					Land Use		Composition of Capital				
			Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re**	
Frequency														
Total Number of Positive Occurences														
	(s')	81	41	34	33	33	32	13	25	14	12	15	--	
	(s'i)	43	23	20	19	19	14	9	13	9	8	8	--	
Associative *Weights*														
Category*1														
	(s')	0	5	6	6	4	3	7	0	3	8	8	--	50/2 = 25
	(s'i)	0	2	6	7	6	7	8	2	3	7	8	--	56/2 = 28
Category 2														
	(s')	0	2	1	0	3	3	2	1	0	0	0	--	12/2 = 6
	(s'i)	0	6	1	0	1	1	1	1	2	2	1	--	16/2 = 8
Category 3														
	(s')	3	1	2	3	2	2	0	3	6	1	1	--	24/2 = 12
	(s'i)	0	0	0	0	0	0	0	1	1	0	0	--	2/2 = 1
Category 4														
	(s')	0	0	0	0	0	0	0	0	0	0	0	--	0/2 = 0
	(s'i)	0	0	1	1	2	1	0	2	3	0	0	--	10/2 = 5
Totals														
	(s')	3	8	9	9	9	8	9	4	9	9	9	--	86/2 = 43
	(s'i)	0	8	8	8	9	9	9	6	9	9	9	--	84/2 = 42

Source : Derived from Figures 4,3,(b') and 4,4, (b')

* Weight Categories are, as defined in Table 4,1

** Real Estate Capital is, (by definition), *not* an attribute of Small Plants

(s') Denotes the layer generated by the distribution of small scale plants in the entire metropolitan area,

(s'i) Denotes the layer generated by the distribution of small scale plants on the Istanbul Side

Table 4.11 A Comparison of Linkage Patterns in the Metropolitan General and Local (Istanbul Side) Representations of the Industrial Geography of Small Plants. Slicing Parameters: Category Specific

		Attributes											
		Employment Characteristics					Land Use		Composition of Capital				
	N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re**	
Frequency													
Total Number of Positive Occurences													
(s)	97	97	79	97	94	86	81	62	74	70	88	--	
(si)	53	50	42	49	46	36	40	31	43	33	46		
Associative *Weights*													
Category*1 (s)	0	1	1	0	0	0	0	0	0	0	0	--	2/2 = 1
(si)	1	1	6	1	1	0	1	0	0	1	2	--	14/2 = 7
Category 2 (s)	1	1	4	2	4	1	3	0	0	0	2	--	18/2 = 9
(si)	0	0	1	2	4	2	5	0	0	1	1	--	16/2 = 8
Category 3 (s)	1	4	0	2	2	0	2	0	1	2	2	--	16/2 = 8
(si)	0	4	1	2	2	1	0	0	0	4	2	--	16/2 = 8
Category 4 (s)	3	3	4	3	3	3	5	1	4	5	2	--	36/2 = 18
(si)	2	3	1	2	1	3	3	1	5	2	3	--	26/2 = 13
Totals (s)	5	9	9	7	9	4	10	1	5	7	6	--	72/2 = 36
(si)	3	8	9	7	8	6	9	1	5	8	8	--	72/2 = 36

Source ; Derived from Figures 4,3,(b) and 4,4, (b)

* Weight Categories are as defined in Table 4,1
** Real Estate Capital is, (by definition), *not* an attribute of Small Plants

(s) Denotes the layer generated by the distribution of small scale plants in the entire metropolitan area,
(si) Denotes the layer generated by the distribution of small scale plants on the Istanbul Side

Not only do we observe a striking similarity in the total number of links, high order links seem to follow almost analogous distribution patterns. In fact, links in the first two categories account for 86 % of all connections in the Istanbul side, and for 72 % in the entire metropolitan area. Moreover, a comparison of Figures 4.3 b' and 4.4.b' suggests that on the whole we have an almost identical connectivity pattern. The conclusion is that, unlike the case observed in its industrial geography generated by the distribution of large plants, one can possibly talk about a general industrial geography of small plants.

The limited number of discrepancies that exist between these two representations may be taken up as pointing out to specificities. As the bulk of these figures consists of high order links, interpretation of Uncertainty Coefficients will be much easier. Besides hints extracted from this particular can be compared with those associated with large plants already discussed. As shown in Table 4.12 such a comparison yields a sharp structural contrast between these two different industrial geographies.

Table 4.12 Istanbul Side; Comparison of Asymmetric Uncertainty Coefficients** Derived from Small and Large Plants**

Independent Attributes ↓			Dependent Attributes ↓										
		N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re
N	(l)	*	,06	,04	,14	,02	,01	,02	,00	,05	,05	,01	,05
	(s)	*	,01	,10	,10	,10	,07	,06	,03	,00	,05	,05	--
Adm	(l)	,06	*	,47	,23	,12	,21	,22	,05	,22	,27	,33	,24
	(s)	,01	*	,24	,38	,28	,47	,34	,03	,18	,32	,32	--
W	(l)	,04	,48	*	,26	,20	,23	,27	,09	,22	,23	,30	,19
	(s)	,19	,23	*	,52	,52	,41	,41	,10	,13	,38	,38	--
MW	(l)	,15	,23	,26	*	,07	,09	,11	,06	,12	,13	,13	,07
	(s)	,18	,37	,51	*	,45	,63	,44	,07	,15	,41	,41	--
Tc	(l)	,02	,12	,20	,07	*	,17	,27	,18	,17	,30	,38	,19
	(s)	,18	,27	,51	,45	*	,45	,44	,12	,15	,41	,41	--
En	(l)	,01	,21	,23	,09	,18	*	,18	,28	,25	,20	,43	,26
	(s)	,12	,41	,36	,56	,40	*	,61	,15	,26	,56	,56	--
CA	(l)	,01	,22	,27	,10	,27	,18	*	,28	,26	,18	,23	,26
	(s)	,07	,24	,29	,31	,31	,49	*	,36	,46	,57	,86	--
UA	(l)	,00	,05	,09	,06	,19	,27	,29	*	,12	,11	,22	,07
	(s)	,05	,05	,02	,09	,06	,10	,43	*	,17	,23	,38	--
OF	(l)	,05	,22	,22	,12	,16	,24	,27	,12	*	,32	,34	,30
	(s)	,00	,13	,09	,10	,11	,20	,46	,14	*	,37	,37	--
Rv	(l)	,05	,27	,23	,13	,30	,20	,18	,11	,34	*	,34	,17
	(s)	,06	,21	,25	,27	,27	,41	,53	,18	,34	*	,65	--
Mc	(l)	,01	,34	,30	,12	,38	,42	,23	,22	,34	,34	*	,30
	(s)	,06	,21	,25	,27	,27	,42	,80	,29	,35	,65	*	--
Re	(l)	,05	,20	,15	,05	,15	,21	,22	,05	,24	,14	,24	*
	(s)	--	--	--	--	--	--	--	--	--	--	--	--

Source: Computed from Figures 2,3,a and 2,2,a (according to slicing parameters derived from the distribution of total plant population).

N.B. Each row comprises two lines, the first line shows Asymmetric Coefficients of Uncertainty in the layer generated by the distribution of Large Scale Plants and the second, those observed on the layer generated by the distribution of small scale establishments.

-- Not produced, since the attribute Real Estate Capital is, *by definition* not an attribute of small scale plants

** Asymmetric Uncertainty Coefficients associated with missing links in Figures 4,4,a' and 4,4,b' are shown as subscripts.

Table 4.12 depicts similarities and dissimilarities in terms of the predictive capabilities of each attribute taken into account. Because of the asymmetrical nature of the index used in description the reduction of uncertainty associated with the prediction of the distribution of an attribute (say Workers (W)) through (say) N may be different than that obtained when (N) is predicted through Workers. (See Table 4.12). This property of Uncertainty Coefficients is useful for the description and analysis of incidences matrices in general and industrial landscapes in particular. Let us now concentrate on dominant industrial geographic features of each one of these layers and summarize differences and similarities as they are produced in Table 4.12.

1. The comparatively low coefficients of uncertainty associated with the attribute N (concentration of plants in terms of numbers) when it is used as a predictor suggest that one can not derive fruitful insights from the presence (absence) of this attribute. But an overview on related diagrams suggests that this simiarity is superficial. In fact, Number of Plants is an almost ubiquitous property of the layer relative to small plants, as no less than 43 out of a total of 49 neighborhoods emerge as being *important* in terms of Number of Plants. These same is not true in large plants category where less than half of neighborhoods are endowed with this attribute. In other words the low predictive capability of the attribute Number of Plants observed in both layers stem from two different reasons. In small plants category almost all neighborhoods are endowed with this attribute whether they comprise other attributes or not. In large plants category however, plant

concentration, may or may not be associated with other attributes. We see that in less than half of the cases it is, while in the remaining it is not. Notice however that N is a relatively predictor of Master Workmen and that it is relatively well predicted by the latter.

This suggests that dissimilar distribution patterns may generate similar uncertainty coefficients and that our interpretations should not be based upon uncertainty coefficients only. But we are going to see that this type of distortion is mostly limited to the attribute Number of Plants.

2. This hidden dissimilarity becomes visible when predictive capabilities of other attributes over N are considered. (See the first column in Table 4.12). In large plants, category *none* of the attributes (except Master Workmen) is a powerful predictor of N. At this scale, it is almost impossible to predict anything useful (other than than some associative relation with Master Workmen) from the presence (absence) of Number of Plants. Asymmetrically remaining attributes (other than MW) are not informative on its distribution.

The situation in small plants category is significantly different however. Number of plants is not a powerful predictor as it is an almost ubiquitous attribute of places whether they depict important concentrations in other attributes or not. But, the first column in Table 4.12 suggests that we do not have the same kind of quasi symmetrical distribution of uncertainty coefficients observed in large plants. The presence of employment categories such as

Workers, Master Workmen, Technicians and Engineers generate non-negligeable reductions of uncertainty concerning the presence of tha attribute N. As far as small plants are concerned, those neighborhoods important in terms of above categories of employment will also depict important plant concentrations but the reverse of this proposition is not true. The same do not hold true for different categories of industrial land use nor capital.

3. Table 4.12 shows that in small plants each employment category is a powerful predictor of the remaining four and is well predicted by the others. Hence, we do not observe the same kind of repulsive relations between skill dependent and less skill dependent employment categories. Finally, reduction of uncertainty in small plants is twice as high as their counterparts in Large plants category.

4. Also in small plants category each employment category emerges as a powerful predictor of Covered Area. Reductions of uncertainty associated with these predictions are significantly higher than their counterparts in large plants. The coefficients of uncertainty shown in Table 4.12 suggest a symmetrical distribution when Covered Area is used as a dependent or independent attribute. The layer relative to small plants has, in this regard, quite different properties.

It is therefore preferable to use Covered area as a dependent variable. Although related coefficients of uncertainty are noticeably higher than those in large plants category, Covered Area is not a powerful independent variable in predicting the distribution of different categories of employment. Thus in the layer relative to small plants the highest reduction of uncertainty takes place when Covered Area is used as a predictor of Engineers and is predicted through Engineers while the opposite is true for large plants.

In both layers Uncovered area is relatively well predicted through Engineers and Technicians. Predictive capabilities of latter employment categories are higher in large plants category as opposed to their performance in the category small plants.

5. If differences in the prediction of Real Estate Capital are set aside, one sees that predictive capabilities of different categories of employment over capital are category specific. In small plants they are powerful predictors of the distribution of Revolving and Machinery. Table 4.12 also shows that reduction of uncertainty is higher when employment categories are taken up as independent attributes (predictors) and slightly lower when their distribution patterns are predicted through Revolving and Machinery capitals.

6. Uncertainty Coefficients among different land-use types and capital items suggest that it is preferable to consider the latter (capital items) as dependent attributes. Predictive capabilities of land-use types are noticeably higher in small plants category as compared to their counterparts in large plants.

Notice also the extremely high reduction of uncertainty between Covered Area and Machinery Capital. Here the presence (absence) of the attribute covered area taken up as an independent attribute leads to an almost complete elimination of uncertainty pertaining to the presence (or absence) of the Machinery capital. With only one discrepant case out of a total of 49 neighborhoods, one is almost certain that if a neighborhood is important in terms of Covered Area it will it will be important in terms of machinery capital. Similarly those places that show concentrations of machinery will (almost) invariably depict important concentrations of Covered production space. In other words in small plants category, Machinery capital is concentrated in those places that depict important concentrations of Covered production space and vice versa.

7. Finally, Table 4.12 suggests that in small plants category, different items of industrial capital are powerful predictors of the remaining ones and that they are symmetrically well predicted by them. As far as predictions among different categories of capital are concerned, the reduction of uncertainty observed in small plants category, is, at least equal to, or greater that observed in the category large plants.

Notice also that the reduction of uncertainty achieved in predicting Machinery through Revolving capital is as high as 65 % and that there exist only two cases in which latter attributes are in a dissociative spatial relation. Hence, those places that show important concentrations of Revolving capital are, most likely to show important concentrations of Machinery capital. If this particular case is set aside, it is preferable to use Covered Area as a predictor of distribution of Machinery or Other fixed capitals rather than Revolving capital. This illustrates the extremely high predictive power of the attribute Covered Area in 'explaining' the distribution of other factors of industrial production in the layer relative to small plants.

These notes suggest a sharp contrast that exists between industrial geographies of small and large scale plants, as it is manifested on the labor intensive production space of Istanbul side. Besides, one can easily derive by implication that, inspite of the presence of numerous high order links in Figure 4.4.b', we are not dealing with a landscape in which every attribute accounts for the distribution of the remaining ten. And that attributes show a noticeable differentiation in terms of their predictive capabilities. This differentiation is illustrated in Table 4.13 which shows the first two 'efficient' predictors of each industrial attribute in small and large scale plants categories.

Table 4.13 Istanbul Side; the First Two 'Efficient' Predictors of each Industrial Attribute

	SMALL Plants: Attributes	SMALL Plants: Best Predictors*		LARGE Plants: Attributes	LARGE Plants: Best Predictors*
	N	← [W, MW, Tc]		N	← [MW]
LABOR	Adm	← [En, MW]	LABOR	Adm	← [W, Mc]
	W	← [MW, Tc]		W	← [Adm, Mc]
	MW	← [En, W]		MW	← [W, Adm]
	Tc	← [W ,MW]		Tc	← [Mc, Rv]
	En	← [MW, CA]		En	← [Mc, UA]
LANDUSE	CA	← [Mc, En]	LANDUSE	CA	← [UA, Tc, W, Of]
	UA	← [CA, Mc]		UA	← [CA, Mc]
CAPITAL	OF	← [CA, Mc]	CAPITAL	OF	← [Rv, Mc]
	Rv	← [CA, Mc]		Rv	← [OF, Mc]
	Mc	← [CA, Rv]		Mc	← [En, Tc]
	Re**			Re	← [Rv, Mc]

Master workmen and Covered Area appearing no less than five times among best predictors, come forth, as key attributes of the industrial landscape of small plants on the Istanbul Side. Notice that these attributes appear together only once. While Covered Area is a powerful predictor of the distribution of different items of capital, Master Workmen have high predictive powers in reducing the level of uncertainty in the distribution of other categories of employment and over N.

As these two key attributes are in a strong associative relation with the attributes they predict, their presence will imply, more often than not, the presence of predicted attributes. This is a significant property of the layer relative to small plants in which, it is sufficient to start analyses with Master Workmen and Covered Area which appear as pivotal elements around which remaining attributes are deployed in space.

Secondly, as these small plants have vertically disintegrated production structures those complementing each other, in the production chain constitute, horizontally integrated production complexes to reduce costs of interaction that would othervise be significantly higher. Such production complexes are usually not important in terms of Uncovered area. If they are, it is due to the aggregation of small amounts of Uncovered areas. It is therefore not surprising to see Covered area as being the best predictor of the distribution of each item of industrial capital. On the other hand for employment analyses, it is useful to start with those places that depict important concentrations of Master Workmen.

On the other hand, if we are looking for the composition of capital in small scale production it would be pertinent to start from those places that depict important concentrations of Covered Area (ie. from horizontally integrated production complexes or 'petty industrial estates') since, those places that do not emerge as being important in terms of Covered Area will, not be important in terms of capital.

Finally, as opposed to the situation observed in large plants category, one detects no signals pertaining to repulsive tendencies among different categories of labor. Engineers stand out as being the best predictor of the distribution of Master Workmen and symmetrically, Master Workmen are powerful predictors of the distribution of Engineers. But, differences between these two layers are not limited to an apparent lack of spatial division labor in the category small plants.

Predictive capability of Master Workmen is limited in large plants category where it has predictive capability over N. Instead of MW and CA that shed light on inherently different aspects of the spatial organization of production in small plants category, we see that Machinery, stands out as being the best predictor of most attributes in large plants. In large plants category Machinery capital figures among the best predictors of no less than 8 attributes. (see: Table 4.13.

The procedure is, thus, capable to detect and put forward non-negligeable structural differences that exist between these two distinct industrial geographies. Although it is encouraging to see results that point out to the relevance and possibility of general industrial landscape analyses, we must not forget that they depend above all, on slicing parameters. In other words, the contrast may be sharp because of high threshold limits applied on the geographic matrix of small scale plants. Because of dissimilarity in factor endowments, and differences in deployment patterns, the same slicing parameter vector is not as effective in reducing variation in the layer relative to large plants. In other words, slicing parameters derived from total plant population leave 'room' for the expression of specificities in large plants. The same is not true for small plants.

When category specific slicing parameters are applied the diagram derived for small plants resembles at least at the first approximation to that of large plants. (compare Figures 2.2.a and 2.4.a) Thus, it will be convenient to assess the sensitivity of previously derived results. A comparative study on Figures 4.4 (b) and 4.4.a' can be a fruitful exercice for the assessment of these sensitivities. It is carried out in two steps. In the first step we concentrate on differences in uncertainty coefficients and in the second we analyse similarities and changes taking place in the list of best predictors.

We are going to see that the bulk of the conclusions pointing out to to differences in these two layers hold true. In brief, spatial organisation of production factors in small and large scale plants categories exhibit noticeable discrepancies.

4.11 Sensitivity of Previous Conclusions on the Level of Abstraction

Changes taking place in Uncertainty Coefficients shown in Table 4.14 show that the use of category specific slicing parameters leads to an overall decrease in the level of Uncertainty coefficients observed in small plants category.

This is not an unexpected result, as group specific slicing parameters are significantly less binding than those derived from the distribution of total plant population. A comparison of Figures 4.4 b and 4.4.b' illustrates the effect scale differences. But although we deal with a significantly more complicated landscape description, previously derived conclusions hold true.

To facilitate comparisons, results derived from Table 4.12 are presented in the same order as before.

1. The attribute Number of plants shows a noticeable increasein the predictive capabilities. Thus the difference observed in Table 4.12 simply disappears. Notice that this attribute (N) reduces uncertainty especially on employment categories and does not explain the distribution patterns of land use and capital. Thus, taken up as an independent attribute (N) is capable to account for the distribution of certain categories and not others. Notice however that its predictive capability over Administrative Personnel can not be taken up at its face value as the latter is extremely 'noisy' in small plants category.

Table 4.14 Istanbul Side; Comparison of Asymmetric Uncertainty Coefficients** Derived from Layers Relative to Small and Large Scale Plants

Independent Attributes ↓		N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re
			Dependent Attributes ↓										
N	(1)	*	,06	,04	,14	,02	,01	,02	,00	,05	,05	,01	,05
	(sc)	*	,16	,27	,14	,10	,06	,07	,03	,02	,09	,08	--
Adm	(1)	,06	*	,47	,23	,12	,21	,22	,05	,22	,27	,33	,24
	(sc)	,16	*	,39	,20	,22	,12	,13	,02	,11	,19	,18	--
W	(1)	,04	,48	*	,26	,20	,23	,27	,09	,22	,23	,30	,19
	(sc)	,28	,40	*	,36	,27	,19	,31	,07	,17	,37	,37	--
MW	(1)	,15	,23	,26	*	,07	,09	,11	,06	,12	,13	,13	,07
	(sc)	,14	,20	,35	*	,29	,08	,27	,06	,10	,16	,13	--
Tc	(1)	,02	,12	,20	,07	*	,17	,27	,18	,17	,30	,38	,19
	(sc)	,10	,22	,27	,29	*	,25	,28	,04	,14	,20	,31	--
En	(1)	,01	,21	,23	,09	,18	*	,18	,28	,25	,20	,43	,26
	(sc)	,07	,12	,19	,08	,25	*	,26	,09	,11	,16	,17	--
CA	(1)	,01	,22	,27	,10	,27	,18	*	,28	,26	,18	,23	,26
	(sc)	,08	,14	,31	,27	,28	,27	*	,18	,14	,21	,23	--
UA	(1)	,00	,05	,09	,06	,19	,27	,29	*	,12	,11	,22	,07
	(sc)	,03	,02	,06	,05	,04	,09	,17	*	,02	,05	,08	--
OF	(1)	,05	,22	,22	,12	,16	,24	,27	,12	*	,32	,34	,30
	(sc)	,02	,11	,17	,10	,14	,11	,14	,02	*	,17	,14	--
Rv	(1)	,05	,27	,23	,13	,30	,20	,18	,11	,34	*	,34	,17
	(sc)	,09	,19	,36	,16	,20	,15	,20	,05	,16	*	,20	--
Mc	(1)	,01	,34	,30	,12	,38	,42	,23	,22	,34	,34	*	,30
	(sc)	,08	,19	,36	,16	,20	,15	,23	,08	,14	,20	*	--
Re	(1)	,05	,20	,15	,05	,15	,21	,22	,05	,24	,14	,24	*
	(sc)	--	--	--	--	--	--	--	--	--	--	--	--

Source: Computed from Simplex Figures 2,4 a, and 2,5,a (according to group specific and general slicing parameters for large plants)

N.B. Each row comprises two lines, the first line shows the asymmetric Coefficients of Uncertainty in the layer generated by the distribution of Large Scale Plants (1) and the second, those observed on the layer generated by the distribution of small scale establishments (sc).

-- Not produced, since the attribute Real Estate Capital is, *by definition* not an attribute of small scale plants

** Asymmetric Uncertainty Coefficients associated with missing links in Figures 4,4,a' and 4,4,b are shown as subscripts.

Predictive capability of N is noticeably higher in small plants category. Although only three of them are considered to be significant at this scale of analysis. (Table 4.14) This suggests that N is basically independent of those categories of employment such as Engineers and Technicians and those associated with land use and capital.

Even if we disregard the superficially high predictive capability of N over Administrative Personnel, Uncertainty Coefficients in both layers convincingly illustrate that those places important in terms of N (plant concentrations) are more likely to be important in terms of skill dependent categories of employment such as (W and MW) rather than capital or land use.

2. Subsequent to the modification of the scale of analysis non-negligeable changes take place in the levels of uncertainty coefficients amongst employment categories . However changes taking place are far from being randomly distributed. On the contrary, the industrial landcape of small plants analysed through less binding slicing parameters show properties that are not unlike those observed on the layer relative to large plants. It is certainly not a coincidence that, in both layers, Master Workmen (which in the labor intensive industrial landscape of the Istanbul side can be taken as a skill dependent category) come forth as being the least successful predictor of Engineers. The reverse also is true in that Engineers are poor predictors of Master Workmen. Thus, in the category small plants, the deployment pattern of different categories of industrial labor is not significantly different than that

observed in large plants category. In both layers, employment categories characteristic of skill dependent and less skill dependent (relatively capital intensive) production processes are mutally repulsive.

3. Employment categories are generally successful in predicting the distribution pattern of Covered Area. The latter (Covered Area) is a powerful predictor of all employment categories except Administratives. Conversely, Table 4.14 indicates that in small plants category employment categories are not powerful predictors for Uncovered Area. Notice that the latter (UA) is adequately predicted through Engineers and Technicians in the layer relative to large plants.

4. A comparison of Table 4.12 and Table 4.14 suggests that reductions of uncertainty associated with the prediction of different items of capital through employment categories are over-amplified in the former (Table). Under less binding slicing parameters, predictive capabilities of employment categories are significantly reduced. Recall that in small plants category coefficients of uncertainty associated with the prediction of Machinery through employment categories were significantly greater than their counterparts in large scale plants. (See Table 4.12) Under less stringent slicing parameters, the gap between small and large scale plants is considerably narrowed. Engineers and Technicians are better predictors in large plants category. Hence our previous conclusions on the efficiency of employment categories

in predicting different items of capital are scale dependent and have to be qualified. (see Table 4.12 and 4.14)

5. Uncertainty Coefficients concerning land use categories suggest that we must modify our previous conclusions in this regard as well. According to Table 4.14 Uncovered and Covered area are better predictors of each other in large plants category.

Notice also that in small plants category, Uncovered Area is not capable to reduce uncertainty in any attribute other than Covered Area while it accounts partially for the distribution of attributes such as Technicians, Engineers, Machinery, Other Fixed capital and Covered Area in large plants. In other words under less severe threshold levels, the superficially high predictive capabilities of Uncovered Area over different items of capital shown in Table 4.12 just disappear. Predictive capabilities of Uncovered Area are thus even lower than N in small plants category. Changes in Uncertainty coefficients associated with Covered Area as predictor shed light on yet another discrepancy between small and large plants. In fact, reductions of uncertainty with Covered Area as a predictor of employment categories are significantly higher in small plants category.

6. Finally, predictive capabilities of different items of industrial capital among themselves are higher in large plants.

In brief, category specific slicing parameters reduces significantly the level of uncertainty coefficients in small plants category. However under less binding slicing parameters we see other aspects of differences that exist between these two layers.

The relatively high predictive capabilities observed in large plants category is, of course not unrelated with the spatial organization of industrial capital. In other words as different items of industrial capital are in a relation of spatial association they are powerful predictors of each other. The same however is less true in small plants category where employment categories such as Workers and Technicians are the best predictors of different items of capital. These conclusions are summarized in Table 4.15 showing the first two powerful predictors of each industrial attribute in each one of these two layers.

It is interesting to see that although category specific slicing parameters lead to decreases in uncertainty coefficents in small plants category, the list of best predictors of different industrial attributes show minor changes. Notice also that those changes that take place do, in no way at all, invalidate our conclusions concerning qualitative differences between these two industrial geographies.

Table 4.15 Istanbul Side; the First Two 'Efficient' Predictors of each Industrial Attribute

	SMALL Plants†			LARGE Plants	
	Attributes	Best Predictors*		Attributes	Best Predictors*
	N	← [W, MW]††		N	← [MW]
LABOR	Adm	← [W, Tc]	LABOR	Adm	← [W, Mc]
	W	← [Mc, Rv, MW]††		W	← [Adm, Mc]
	MW	← [W, Tc]		MW	← [W, Adm]
	Tc	← [MW, Ca]		Tc	← [Mc, Rv]
	En	← [CA, Tc]		En	← [Mc, UA]
LANDUSE	CA	← [W, MW]	LANDUSE	CA	← [UA, Tc, W, Df]
	UA	← [CA,]		UA	← [CA, Mc]
CAPITAL	OF	← [W, Rv]	CAPITAL	OF	← [Rv, Mc]
	Rv	← [W, CA]		Rv	← [OF, Mc]
	Mc	← [W, Tc]		Mc	← [En, Tc]
	Re**			Re	← [Rv, Mc]

Source : Derived from Table 4.14

† Layer for small plants is generated through category specific slicingf parameters
†† Because of its noisy Administrative Personnel is not included in this list of best predictors

* Best Predictors in terms of Reduction of Uncertainty
** Missing by Definition.

In small plants category, Master Workmen and Covered Area stand out as second best predictors for the remaining attributes. Notice that modification of the scale of analysis increases predictive capabilites Workers. Recall that they appeared only twice in the previous list for best predictors. (see Table 4.13) This attribute now emerges as being a powerful predictor for 7, out of a total of 10 attributes.

On the other hand, with the introduction of category specific slicing parameters, Covered Area ceases to be the most efficent predictor for different items of capital. Its role is now assumed by Workers, which, as depicted in ın Table 4.15. emerge as an efficient predictor for capital together with N, Administrative Personnel, Master Workmen and Covered Area.

Consequently, at this representation of the production space Workers are endowed with predictive capabilities similar to those assumed by Machinery in large plants. Hence, Workers, replacing both Master Workmen and Covered Area in terms of predictive capabilities, come forth as a central element in the organization of the labor intensive industrial geography of small scale plants on Istanbul side.

However, this modification which replaces one employment category of small plants with another without causing a drastic decrease in the role of Covered area as a predictor, does neither affect the 'nature of the explanation' nor put at stake the validity of the structural contrast between these two industrial geographies.

These results are important for three different reasons.

First, modification of the scale of analysis causes a general decrease in Uncertainty coefficients and modifies the ranks of attributes in the list of best predictors. But it does not yield results that could be very hard to interpret in theoretical terms. In other words, structural discrepancies between industrial geographies generated by the distribution of attributes from small and large scale plants are resistant, to scale changes especially if we concentrate on the content of the signals and not exclusively on the list of best predictors.

Secondly, no matter how they are interpreted, it is evident that non-negligeable changes take place in the values of uncertainty coefficents as we pass from one level of abstraction to another.

Finally if students do not explicitly acknowledge the scale dependency of their observations, it is quite possible for them to study the same geographic phenomenon (ie. industrial geography of small plants on the Istanbul Side) and come up with results that could be hard to harmonize. Dissimilarities between Figures 4.4.b' and 4.4.b can be taken as examples of issues that might be raised. However, it is encouraging to see that in spite of all these changes, the procedure is capable to detect signals enabling us to distinguish between these two distinct industrial geographies.

4.12 An Overview on Industrial Geographies of Small and Large Plants on the Beyoglu Side ; A Comparative Overview based upon Slicing Parameters Derived from the Distribution of Total Plant Population

Our exploratory study suggests that industrial production factors are deployed on the Beyoglu side according to patterns similar to those observed on the Istanbul side. However, because of its limited hinterland across which plants may decentralize and because of its particularly long industrial history, it is at this sector that we observe the most concentrated production factor deployment patterns. It also at this sector that small plants account for the largest share in the total plant population (75 %). (Güvenç, 1992 :140). On the other hand, the expansion of the CBD towards this direction, details of which are presented in a recent historical analysis of the development of the city (Tekeli, 1992) is accompanied by soaring land prices. This process reduced the chances of industrial decentralization. Thus plants located on this side have very opportunites to decentralize on the same sector.

When these geographic features are jointly considered, it is not surprising to see that the bulk of plants keep on operating in lofts or even in flats. This accounts for the limited number of neigborhoods endowed with the attribute Uncovered Area. In other words Beyoglu side has an industrial landscape in which plants can hardly decentralize, unless they decide quit their labor pools. It follows that small or large scale production is carried out within the city.

Because of the high number of small plants, Beyoglu side has the lowest capital per employee ratio. Our exploratory study shows that Beyoglu side is specialized in only two trades (Wooden Furniture making and Upholstery and Office machines which rank 31th and 23th in terms of capital intensity. (Güvenç, 1992: 157) Thus, as it was the case on Istanbul side we are going to study a labor intensive landscape. We may expect to detect some similarities with the latter. However, factors such as low chances for industrial decentralization, highly concentrated production factor deployment patterns, do lead to modifications.

For the ease of exposition, we start with a comparative analysis on the properties of the two layers. This comparative landscape analysis is carried out in two steps. We present first, a comparative analysis of industrial geographies of small and large plants, using slicing parameters derived from total plant population. Areal associations among pairs of industrial attributes in each layers are measured through Gamma indices and are shown in Figures 4.5.a' and 4.5.b'. Category specific slicing parameters are used in the second place. Considering the fact that less severe slicing parameters affect most the representation of the layer relative to small plants, the validity of previously derived results is tested. This test enabled us to discuss differences that exist between Figures 4.5.a' and 4.5.b.

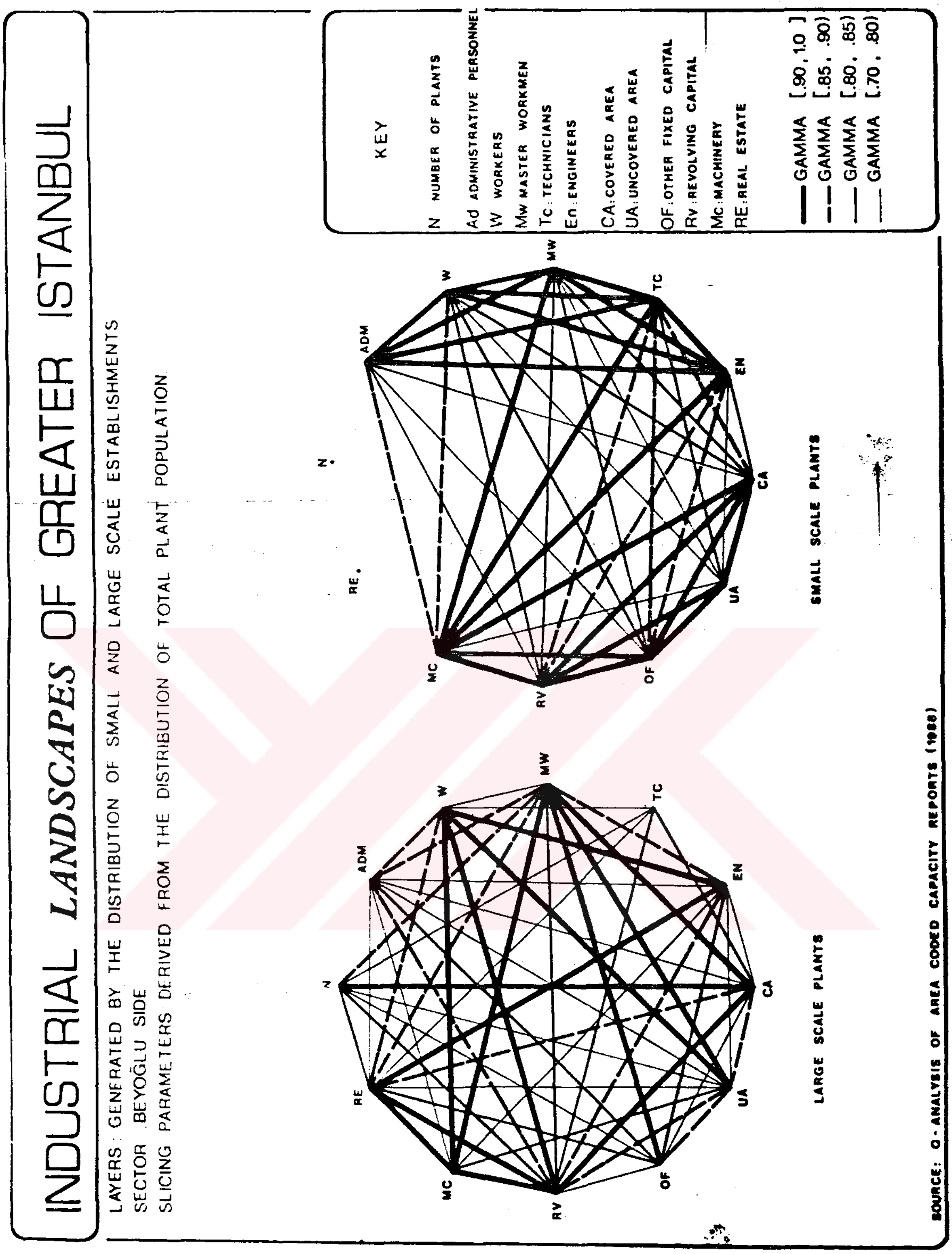


Figure 4.5 (a'-b') Beyoglu Side: Spatial Associations among Attributes in Large (a') and Small Plants (b') : Slicing Parameters: General

Table 4.16 Beyoglu Side; Comparison of Asymmetric Uncertainty Coefficients** Derived from Layers Relative to Small and Large Scale Plants**

Independent Attributes ↓			Dependent Attributes ↓										
		N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re
N	(1)	*	,07	,01	,21	,20	,07	,41	,14	,11	,17	,03	,26
	(s)	*	.01	.00	.00	.08	.06	.04	.04	.04	.04	.06	--
Adm	(1)	,08	*	,21	,21	.04	,14	,11	,27	,16	,26	,16	,14
	(s)	.02	*	,43	,36	,54	,43	,27	,24	,27	,27	,38	--
W	(1)	,01	,21	*	,14	,12	,46	,09	,48	,08	,42	,33	,21
	(s)	.01	,42	*	,51	,43	,29	,33	,29	,33	,33	,23	--
MW	(1)	,25	,21	,14	*	,12	,20	,42	,48	,22	,22	,33	,21
	(s)	.00	,35	,50	*	,82	,34	,37	,32	,37	,37	,27	--
Tc	(1)	,22	,04	,11	,11	*	,04	,14	,19	,08	,14	,06	,13
	(s)	,15	,50	,42	,79	*	,40	,41	,36	,41	,41	,33	--
En	(1)	,08	,14	,46	,21	,04	*	,11	,27	,16	,26	,16	,30
	(s)	.11	,37	,25	,31	,37	*	,19	,11	,19	,19	,46	--
CA	(1)	,48	,12	,09	,43	,16	,12	*	,41	,16	,31	,10	,27
	(s)	.05	,16	,20	,22	,26	,13	*	,27	1,00	1,00	,43	--
UA	(1)	,12	,21	,38	,38	,16	,21	,32	*	,18	,32	,28	,21
	(s)	.04	.12	,15	,16	,17	,06	,22	*	,23	,23	,08	--
OF	(1)	,12	,16	,08	,21	,09	,16	,15	,22	*	,15	,11	,16
	(s)	.05	,16	,20	,22	,26	,13	1,00	,27	*	1,00	,43	--
Rv	(1)	,20	,27	,43	,23	,16	,27	,31	,41	,16	*	,43	,55
	(s)	,05	,16	,20	,22	,26	,13	1,00	,27	1,00	*	,43	--
Mc	(1)	.04	,17	,34	,34	.07	,16	,10	,36	,11	,43	*	,34
	(s)	,10	,31	,19	,23	,28	,43	,58	,14	,58	,58	*	--
Re	(1)	,30	,14	,21	,21	,15	,30	,26	,27	,16	,54	,33	*
	(s)	--	--	--	--	--	--	--	--	--	--	--	--

Source: Computed from Simplex Figures 2,2, b and 2,3,b (according to slicing parameters derived from the distribution of total plant population).

N.B. Each row comprises two lines, the first line shows the asymmetric Coefficients of Uncertainty in the layer generated by the distribution of Large Scale Plants and the second, those observed on the layer generated by the distribution of small scale establishments.

-- Not produced, since the attribute Real Estate Capital is, *by definition* not an attribute of small scale plants

** Asymmetric Uncertainty Coefficients associated with missing links in Figures 4,5,a' and 4,5,b' are shown as subscripts.

Asymmetric Uncertainty Coefficients associated with representations of industrial landscapes shown in Figures 4.5.a' and 4.5.b' are produced in Table 4.16. One can easily detect by comparing Figures 4.4.(a'-b') and 4.5.(a'- b') or Tables 4.12 and 4.16, a number of similarities as well as discrepancies between production factors deployment patterns observed on the Beyoglu side and those observed on the Istanbul side. In what follows, these similarities and discrepancies will be discussed in the usual format.

1. In the layer relative to small plants, N is endowed with limited predictive capabilities. Notice also that N performs in exactly the same way as it did on the Istanbul side. This of course is not unrelated with the fact that in small plants category concentration of plants is a ubiquitous property of geographic individuals whether they are endowed with other attributes or not. In small plants category, it stands out as an attribute that is largely independent of the presence or absence of other industrial attributes. Thus, one can not infer anything useful starting from the attribute N. Similarly, remaining attributes are not very instructive on the presence of N. Although there exists hardly any difference in terms of predictive capabilities of N between Istanbul and Beyoglu sides, it is (asymmetrically) well predicted through four employment categories on the former side. Thus, as far as N is concerned, observations on the Beyoglu side are similar to those derived for the Istanbul side. It is encouraging to see this general property of the industrial geography of small plants which

suggests common elements in the spatial organization of production factors.

However the situation in large plants category suggests that conclusions arrived at on the Istanbul side need qualification. In fact, on the Beyoglu side, N stands out as a relatively powerful predictor of Master Workmen, Technicians, Covered Area, Uncovered Area, Real Estate Machinery and Other Fixed capitals. This suggests that we have to reconsider our previous conclusions. But, if these results are interpreted considering the properties of the spatial context, this difference is *not* as important as it appears in the first approximation. It is evident that because of its limited hinterland, expansion of the CBD, which leads to a competition from other land-use types, Beyoglu side does not provide plants with chances of decentralization comparable to those observed on Istanbul and Anatolian sides. As a result large plants are concentrated in few sectors and operate mostly within lofts and transformed apartment blocks. It is this concentration of large plants that makes N a relatively powerful predictor of other industrial geographic attributes. Hence, if interpreted according to the properties of the spatial context from which they are derived -and not in a mechanical way- the relatively and unexpectedly high predictive capability of the attribute N does not put at stake conclusions that we have previously derived. Of course, not every kind of large scale industrial production can possibly be carried out in such a limited spatial context. And, it is believed that this property reflects itself in the list of trades in which Beyoglu side is found to be specialized in.

2. Secondly, reductions of uncertainty when different categories of employment are used as predictors of others, indicate that differentiation in predictive capabilities of skill dependent and less skill dependent categories is not as strongly evidenced on Beyoglu side as it is on Istanbul side. In small plants category it is visible through relatively low Coefficients of Uncertainty for the pair Technicians and Master Workmen. Notice also that latter categories are disconnected in Figure 4.5.a'. As opposed to their counterparts in large plants, different categories of employment are much strongly associated with each other. (Compare Figure 4.5.a' and 4.5.b') This property manifests itself in relevant entries of Table 4.16 as differences between predictive capabilities of different categories of employment in small and large scale plants. The difference between Figures 4.5.a' and 4.5.b' suggests that in small plants, employment categories are endowed with significantly higher predictive capabilities in accounting for the distribution patterns of others. The attribute pair Workers-Engineers is the only discrepant case, with higher predictive capabilities in large plants category. If we consider that at this particularly high level of abstraction the industrial geography of small plants is not particularly rich in terms of Engineers this discrepancy does not constitute an intractable issue.

3. The difference between these two different industrial geographies manifests itself also in Uncertainty Coefficients computed for contingency tables between different employment and land-use categories. As it was previously the case on the Istanbul Side, in small plants, employment categories are noticeably better

predictors of Covered Area and that they are comparatively well predicted by the latter. However, the difference in asymmetric uncertainty coefficients (see Table 4.16) suggests that it is preferable to use employment categories as predictors. Notice that the opposite is true when Uncovered Area is predicted through employment categories. Here, (Technicians set aside), employment categories in large plants are much better predictors. Again, asymmetry in the values of Uncertainty Coefficents suggests that it preferable to use employment categories as predictors. Recall that small and large scale industrial landscapes of Istanbul side revealed similar properties. (see: Table 4.12)

4. If trivial differences relative to the prediction of Real Estate capital (dependent attribute) are set aside, we see that employment categories in small plants are, as compared to their counterparts in large plants, noticeably better predictors for most items of capital.

Notice however, that Workers, Master Workmen, and Engineers in large scale plants are significantly powerful predictors for Revolving and Machinery capitals. The relatively high predictive capability of Master Workmen as a predictor of Machinery in large plants, may not be unrelated with concentrated production factor deployment patterns, observed on this side. This capability of Master Workmen as a predictor of different items of industrial capital is a sign reflecting the specificity of the Beyoglu side.

5. Table 4.16 also shows that Covered and Uncovered area are much better predictors of each other in large plants category. This constitutes yet another aspect of the specific character of the industrial geography of Beyoglu side. Recall that the opposite was true on Istanbul Side. However, it is believed that differentiation in predictive capabilities of these attributes is much more interesting when they are used as predictors of different items of capital. In small plants, Covered Area accounts totally for the distribution of Revolving and Other Fixed Capitals. In other words, to know that a particular neighborhood depicts a significantly high concentration of Covered area, enables us to infer that the latter (neighborhood) will be endowed by noticeable concentrations of Revolving and Other fixed capitals and vice versa. Hence those neighborhoods that are important in terms of Revolving and Other fixed capital will invariably be important in terms of Covered Area, and as a corrolary, those that do not comprise important concentrations of latter items will not be important in terms of Covered area. Notice that at this very point, a sharp contrast exists between industrial geographies of small and large plants. (See Table 4.16)

6. When different items of capital are used as predictors of each other, Reductions of Uncertainty are significantly higher in small plants category as compared to similar predictions in large plants. Notice that predictor attributes are more efficient on the Beyoglu side.

As far as small plants are concerned, there are no significant changes in lists of best predictors derived for Istanbul and Beyoglu sides. In fact, (predictors for Engineers and Uncovered Area set aside) there exists at least one and occasionnaly two common attributes in the list of best predictors. In both layers, Covered Area is the best predictor for different items of capital. The same however is not true in large plants category where we have a significantly different list of best predictors for Beyoglu Side. This may stem from their extremely concentrated distribution pattern and from the nature of industries in which this side is specialized in.

Thus, on many important aspects industrial landscapes observed on the Beyoglu side are similar to those observed on Istanbul side. Discrepancies stem mostly from the extremely concentrated production factor deployment patterns observed on Beyoglu side which presents limited possibilities for industrial decentralization. These results are summarized in Table 4.17.

Although the contrast between these two industrial geographies hardly needs any further commentary, it might be useful to repeat the same exercice, using category specific slicing parameters. Representations of these two different industrial geographies are shown in Figures 4.5 a and b and the matrix of Uncertainty coefficients in Table 4.18 below. This matrix is different from Table 4.14, in that category specific slicing parameters are used in both layers.

Table 4.17 Comparison of the First Two 'Efficient' Predictors[+] of each Industrial Attribute in Istanbul and Beyoglu Sides

	SMALL Plants: Attributes	SMALL Plants: Best Predictors*	LARGE Plants: Attributes	LARGE Plants: Best Predictors*
	N	← [Tc, En] (b)	N	← [CA, Re] (b)
	N	← [W, MW, Tc] (i)	N	← [MW] (i)
LABOR	Adm	← [Tc, MW] (b)	Adm	← [Rv, W] (b)
LABOR	Adm	← [En, MW] (i)	Adm	← [W, Mc] (i)
LABOR	W	← [MW, Tc] (b)	W	← [En, Rv] (b)
LABOR	W	← [MW, Tc] (i)	W	← [Adm, Mc] (i)
LABOR	MW	← [Tc, W] (b)	MW	← [CA, UA] (b)
LABOR	MW	← [En, W] (i)	MW	← [W, Adm] (i)
LABOR	Tc	← [W, MW] (b)	Tc	← [N, CA] (b)
LABOR	Tc	← [W, MW] (i)	Tc	← [Mc, Rv] (i)
LABOR	En	← [Mc, Tc] (b)	En	← [W, Rv] (b)
LABOR	En	← [MW, CA] (i)	En	← [Mc, UA] (i)
LAND USE	CA	← [Rv, Mc] (b)	CA	← [MW, N] (b)
LAND USE	CA	← [Mc, En] (i)	CA	← [UA, Tc, W,] (i)
LAND USE	UA	← [Tc, MW] (b)	UA	← [W, MW] (b)
LAND USE	UA	← [CA, Mc] (i)	UA	← [CA, Mc] (i)
CAPITAL	OF	← [CA, Rv, Mc] (b)	OF	← [MW, UA] (b)
CAPITAL	OF	← [CA, Mc] (i)	OF	← [Rv, Mc] (i)
CAPITAL	Rv	← [CA, OF, Mc] (b)	Rv	← [Re, Mc] (b)
CAPITAL	Rv	← [CA, Mc] (i)	Rv	← [OF, Mc] (i)
CAPITAL	Mc	← [En, CA] (b)	Mc	← [Rv, Re] (b)
CAPITAL	Mc	← [CA, Rv] (i)	Mc	← [En, Tc] (i)
CAPITAL	Re**		Re	← [Rv, Mc] (b)
CAPITAL	Re**		Re	← [Rv, Mc] (i)

Source : Derived from Tables 4.12 and 4.16

[+] Because of its *noisy* definition 'Administrative Personnel' is not included in the list of Best Predictors in small plants category.
* Best Predictors in terms of Reduction of Uncertainty
** Missing by Definition.
(b) Denotes Beyoglu Side
(i) Denotes Istanbul Side

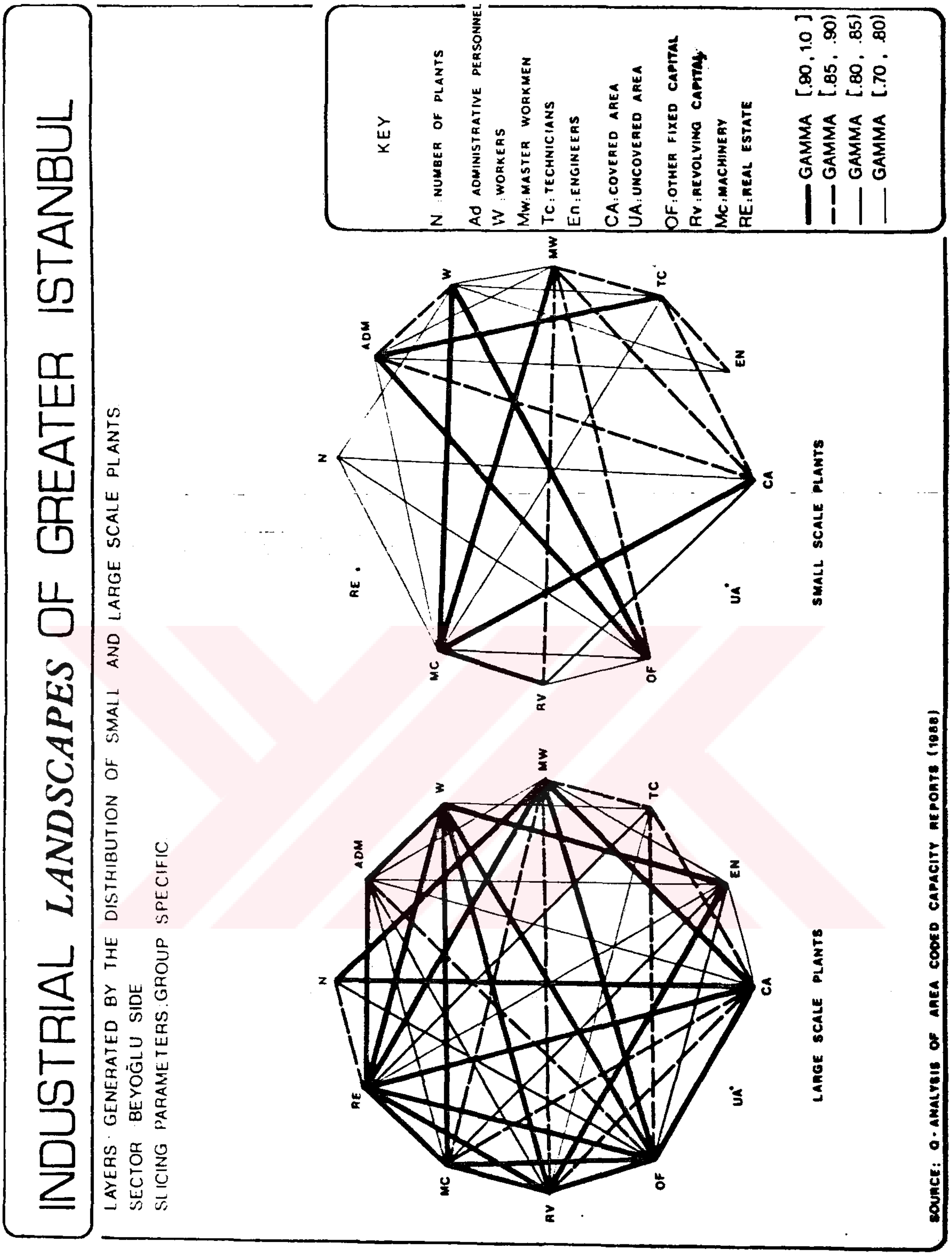


Figure 4.5 (a-b) Beyoglu Side: Spatial Associations among Attributes in Large (a') and Small Plants (b') : Slicing Parameters: Group Specific.

If one recalls that plant concentrations observed on the Beyoglu side are located, more often than not, in and around new extensions of the CBD in Şisli, Mecidiyeköy and Ayazağa, it is probably not surprising to see Real Estate capital and Covered Area to stand out, as being the most efficient predictors of this landscape. Notice that the attribute Real Estate capital is present in 10 different lists of best predictors and Covered Area in some 6 different lists. The same is, however, not true for Istanbul side where none of the predictors is endowed with a comparable capability. The presence of central and peripheral neighborhoods in the representation generates considerable increases in the number of discrepancies and reduces uncertainty coefficients. As a consequence, the attribute N does not account for the distribution of any other industrial attribute.

Machinery capital, Engineers and Administrative Personnel appearing in four different lists stand out as relatively efficient predictors. Discrepancies are also visible, in the layer relative to small plants. Hence, while Workers, Covered Area, and Master Workmen are the most powerful predictors on Istanbul side, their predictive capabilities are noticeably lower on Beyoğlu side.

On the Beyoglu side, Machinery come forth as being capable to account partially for the distribution of attributes as varied as N, Workers, Master Workmen, Covered and Uncovered Area and Revolving capital.

Geographic variation in Uncertainty coefficients shown in Table 4.18 indicates that concentrated production factor deployment patterns observed on Beyoğlu side, are associated with non negligeable changes in predictive capabilities of different industrial attributes.

But, we must explicitly acknowledge that all these results depend, above all on values assigned to different slicing parameters. So, it is necessary to study changes taking place when less severe threshold levels are used.

For instance, in large plants category, the attribute N stands out as a powerful predictor of the distribution of Covered Area, Real Estate Capital and Other Fixed capitals and is symmetrically well predicted by the latter. In both Istanbul and Beyoglu sides, N is a powerful predictor of only Master Workmen which suggests a positive associative spatial relation between skill dependent employment and a concentration of plants.

The relatively high predictive capability of the attribute N observed on Beyoglu side is surely not unrelated with the fact that because of the competition of other land use types, high land prices, institutional barriers such as forests and military zones, and finally the presence of a limited hinterland, this sector presents very few chances for industrial decentralization.

Table 4.18 Beyoglu Side; Comparison of Asymmetric Uncertainty Coefficients** Derived from Layers Relative to Small and Large Scale Plants**

Independent Attributes ↓ / Dependent Attributes ↓

Independent Attributes		N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re
N	(lc)	*	,06	,07	,28	,03	.01	,55	,24	,18	,07	.07	,23
	(sc)	*	.10	,14	,05	,09	,02	,12	,18	,11	,02	,14	--
Adm	(lc)	,06	*	,35	,13	.11	,17	,13	,24	,42	,18	,18	,48
	(sc)	.10	*	,23	,17	,48	,17	,20	,18	,34	,10	,14	--
W	(lc)	,07	,36	*	,11	,13	,36	,11	,32	,28	,33	,33	,36
	(sc)	,15	,25	*	,16	,18	,29	,33	,29	,33	,33	,23	--
MW	(lc)	,28	,13	,11	*	,22	,13	,55	,37	,35	,24	,24	,45
	(sc)	.00	,35	,14	*	,23	,05	,20	,18	,20	,26	,33	--
Tc	(lc)	,03	,10	,13	,22	*	,10	,22	,21	,36	,13	,04	,18
	(sc)	,09	,50	,17	,23	*	,24	,22	,23	,45	,08	,17	--
En	(lc)	,01	,17	,35	,13	,11	*	,13	,24	,18	,35	,18	,48
	(sc)	.02	,17	,14	,05	,23	*	,03	,18	,34	,02	,08	--
CA	(lc)	,55	,13	,11	,57	,23	,13	*	,37	,35	,24	,24	,45
	(sc)	,13	,22	,06	,22	,22	,03	*	,32	,15	,21	,35	--
UA	(lc)	,16	,17	,21	,25	,15	,17	,25	*	,34	,21	,21	,29
	(sc)	,14	,14	,21	,14	,17	,14	,22	*	,31	,19	,21	--
OF	(lc)	,17	,39	,26	,33	,34	,17	,33	,48	*	,26	,26	,42
	(sc)	,12	,36	,28	,21	,45	,36	,14	,43	*	,16	,18	--
Rv	(lc)	,07	,18	,33	,25	,13	,36	,25	,32	,28	*	,33	,36
	(sc)	,02	,11	,11	,28	,08	,02	,21	,27	,16	*	,35	--
Mc	(lc)	,07	,18	,33	,25	,04	,18	,25	,32	,28	,33	*	,36
	(sc)	,16	,16	,30	,36	,18	,02	,35	,29	,19	,35	*	--
Re	(lc)	,22	,47	,35	,44	,18	,47	,44	,42	,44	,35	,35	*
	(sc)	--	--	--	--	--	--	--	--	--	--	--	--

Source: Computed from Simplex Figures 2.4.b and 2.5.b (according to category specific slicing parameter vectors,

N.B. Each row comprises two lines, the first line shows the asymmetric Coefficients of Uncertainty in the layer generated by the distribution of Large Scale Plants and the second, those observed on the layer generated by the distribution of small scale establishments,

-- Not produced, since the attribute Real Estate Capital is, by definition not an attribute of small scale plants

** Asymmetric Uncertainty Coefficients associated with missing links in Figures 4.5.a and 4.5.b are shown as subscripts, As a consequence, there exist few neighborhoods that are rich in attributes other than N, characteristic of fringe areas As far as associations with N are concerned, such neighborhoods increase the number of discrepant cases and reduces predictive capabilities of the latter over remaining attributes.

Lacking such neighborhoods, Beyoglu side is a special case, or as a subset of the landscape observed on Istanbul side. Hence comparisons are not between comparable entities. For, we have on the one hand, a sector that presents very little opportunities for industrial decentralization (Beyoglu side) and another with a vast hinterland in which plants may decentralize (Istanbul side). Uncertainty coefficients produced in Table 4.18 are bound to reflect both properties of different categories of plants and the impact of geographic constraints that leave very little room for industrial decentralization. And, unless the periphery of Istanbul side is not filtered off, one should not expect much stability in Uncertainty Coefficients. For a geographically relevant comparative landscape analysis, it is necessary to exclude those neighborhoods with industrial geographic properties of fringe areas.

Unless students pay attention to this property of landscape analysis, differences and discrepancies in the list of best predictors shown in Table 4.19 can hardly be accounted for.

Table 4.19 Comparison of the First Two 'Efficient' Predictors⁺ of each Industrial Attribute in Istanbul and Beyoglu Sides (According to Group specific slicing parameters).

	SMALL Plants		LARGE Plants	
	Attributes	Best Predictors*	Attributes	Best Predictors*
	N	← [Mc, W] (b)	N	← [CA, MW, Re] (b)
	N	← [W, MW,] (i)	N	← [None] (i)
LABOR	Adm	← [Tc, OF] (b)	Adm	← [Re, OF] (b)
	Adm	← [W, Tc] (i)	Adm	← [Mc, En] (i)
	W	← [Mc, OF] (b)	W	← [Re, En, Adm] (b)
	W	← [Mc, Rv] (i)	W	← [Re, Adm] (i)
	MW	← [Mc, Rv] (b)	MW	← [CA, Re] (b)
	MW	← [W, Tc] (i)	MW	← [W, CA] (i)
	Tc	← [OF, En] (b)	Tc	← [OF, CA] (b)
	Tc	← [MW, CA] (i)	Tc	← [Rv, Mc] (i)
	En	← [OF, W] (b)	En	← [Re, Rv] (b)
	En	← [CA, Tc] (i)	En	← [Mc, W, Adm] (i)
LAND USE	CA	← [Mc, W] (b)	CA	← [MW, CA] (b)
	CA	← [W, MW] (i)	CA	← [Adm, Mc] (i)
	UA	← [Tc, En] (b)	UA	← [Re, CA] (b)
	UA	← [CA,] (i)	UA	← [CA, En] (i)
CAPITAL	OF	← [Tc, En,] (b)	OF	← [Re, Adm] (b)
	OF	← [W, Rv] (i)	OF	← [Adm, Re,] (i)
	Rv	← [Mc, W] (b)	Rv	← [Re, En] (b)
	Rv	← [W, CA] (i)	Rv	← [Mc, Tc] (i)
	Mc	← [CA, Rv] (b)	Mc	← [Re, Rv] (b)
	Mc	← [W, Tc] (i)	Mc	← [En, Rv] (i)
	Re**		Re	← [En, Adm] (b)
	Re**		Re	← [W, OF, En] (i)

Source : Derived from Tables 4.14 and 4.18

4. 13 An Overview on Industrial Geographies of Small and Large Plants on Anatolian Side; Two Comparative Landscape Analyses

Centrographic analyses in our exploratory study suggest that the Anatolian side of metropolitan area is fully or partially specialized in trades such as;

1 . Paints and Varnish

2 . General Chemistry

3 . Pharmaceuticals

4 . Automotive

5 . Artificial Fertilizers

6 . Miscellaneous Chemical Products

7 . Automotive (ancillary industries)

8 . Ship building

9 . Carpets, Rugs and Rope Making

10. Non-ferrous Metals

11. Timber, Wood, Packaging

12. Iron and Steel

13. Petrochemicals

14. Machinery

15. Electronics and Alarm systems

16. Glass and Glass products

This study also shows that, no less than 13 of these trades concentrated on the Anatolian side, occupy highest ranks in terms of capital intensity while those on Istanbul and Beyoglu sides are characterized with the lowest levels of capital intensity. Thus, we will discover the properties of production spaces generated by the distribution of capital intensive trades. Prior to the analysis of these landscape it would be pertinent to lay stress on the following points.

1. Industrial landscapes of Anatolian side are generated through decentralized production factor deployment patterns, in which there exists no zone specialized in small scale industrial production as it was the case on Beyoglu and Istanbul sides.

2. Moreover, one can hardly detect any industrial concentration in and around the center of gravity of distribution of population comparable to those observed around Bomonti and Gayrettepe and Topkapı-Maltepe in Beyoglu and Istanbul sides respectively.

3. Besides, positions of the centers of gravity of the distribution of population and production factors such as capital and labor show that the gap between these centers is widening and that processes of industrial decentralization unfold more rapidly.

4. Finally, notice that various trades in which Anatolian side is specialized in, do not, as opposed to those on Istanbul and Beyoglu sides, accomodate easily with the disintegration of the production chain. It is evident that disintegration is easier in trades such as textiles and garment than it is in trades such asiron and steel or pharmaceuticals. This property of trades concentrated on the Anatolian side makes that small plants account for a lower

share in the total plant population (54 %). Recall that the category small plants covered no less than 70 % and 77 % of the total plant population of Istanbul and Beyoglu sides.

Hence, the following landscape analysis will illustrate properties of a capital intensive production space generated by the distribution of trades that have little or no room for vertical disintegration.

The order of presentation is the same as before. We start with a comparative overview on the industrial geographies of small and large plants using slicing parameters derived from the distribution of total plant population and derive the list of best predictors of each industrial attribute.

As before, the sensitivity of these results to the scale of analysis is tested through category specific slicing parameters. To recapitulate we present a comparative analysis of labor and capital intensive landscapes taken from Istanbul and Anatolian sides.

4.14 Industrial Geographies of Small and Large Scale Plants on the Anatolian Side; an Analysis based upon Slicing Parameters Derived from the Distribution of Total Plant Population.

Asymmetric Uncertainty Coefficients associated with Figures 4.6 a' and 4.6.b', shown in Table 4.20 enable us to extract the following features of the distinct industrial geographies of small and large plants on the Anatolian side

1. We must point out to the fact that Figures 4.6.a' and 4.6.b' reflect the structural contrast between Figures 2.2.c and 2.4.c . At this scale of analysis, small plants on Anatolian side are represented in a very simple way. Notice that the representation in Figure 4.6.b' comprise only six links. Most of the links are missing, especially because the distribution of small plants on Anatolian side generates a landscape that is poor in terms of capital attributes. Recall simplex Figure 2.2.c. We must emphasize that, in this particular case, and at this scale of analysis, missing links stem from lack of attributes and not from the weakness of areal associations. The conclusion is that, not only do we have a lesser amount of small plants, they are deployed in such a way that none of the neighborhoods depict a concentration of say machinery capital comparable to those observed on Istanbul and Beyoglu sides.

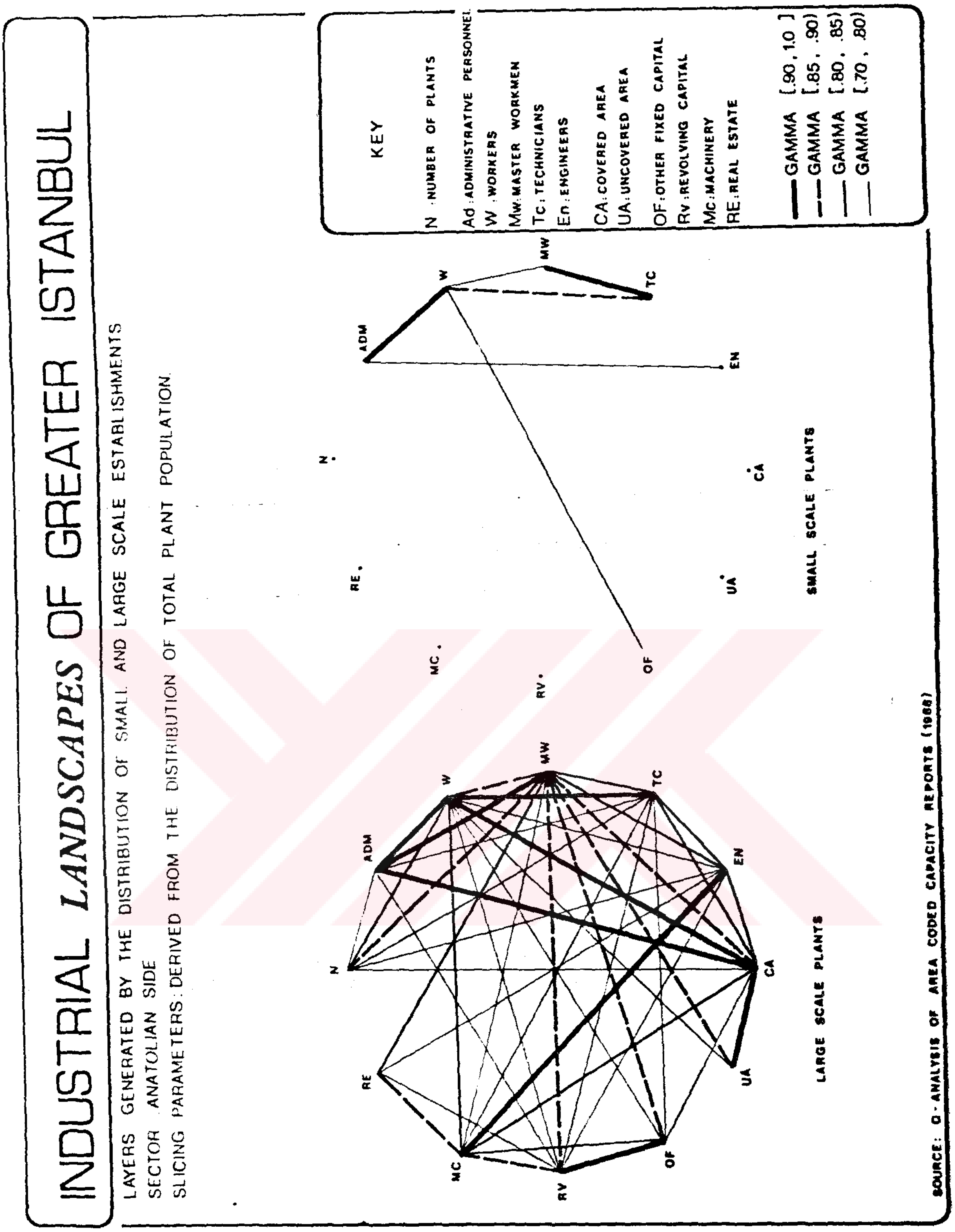


Figure 4.6 (a'-b') **Anatolian Side: Spatial Associations among Attributes in Large (a') and Small Plants (b') : Slicing Parameters: General**

Table 4.20 Anatolian Side; Comparison of Asymmetric Uncertainty Coefficients** Derived from Layers Relative to Small and Large Scale Plants** (Slicing Parameters derived from the distribution of Total Plant Population

Independent Attributes ↓ — Dependent Attributes ↓

		N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re
N	(1)	*	,14	,09	,19	,06	,06	,08	,00	,04	,03	.02	,04
	(s)	*	,20	.14	.17	.23	,01	--	,02	,11	--	--	--
Adm	(1)	,06	*	,51	,36	,15	,10	,43	,10	,11	,12	,12	,07
	(s)	,15	*	,57	,02	,07	,24	,11	.13	,06	--	--	--
W	(1)	,13	,53	*	,26	,32	,17	,34	,15	,17	,15	,21	,10
	(s)	,07	,37	*	,09	,29	,11	--	,13	,03	--	--	--
MW	(1)	,20	,37	,26	*	,21	,20	,33	,20	,26	,24	,13	,20
	(s)	.11	,02	,12	*	,45	,01	--	.02	,04	--	--	--
Tc	(1)	,09	,15	,31	,20	*	,21	,16	,06	,17	,12	,18	,07
	(s)	,20	,07	,48	,60	*	,01	--	,02	,07	--	--	--
En	(1)	,09	,10	,17	,20	,21	*	,16	,10	,11	,12	,33	,12
	(s)	.01	,34	,23	,02	,01	*	--	,01	,18	--	--	--
CA	(1)	,08	,31	,24	,23	,12	,11	*	,24	,08	,04	,13	,02
	(s)	-	--	--	--	--	--	*	--	--	--	--	--
UA	(1)	,00	.09	,12	,17	,05	,09	,29	*	,04	.07	.03	.02
	(s)	,02	.00	,13	,02	,02	,01	--	*	,21	--	--	--
OF	(1)	,06	,12	,17	,26	,17	,12	,11	,05	*	,37	,21	,10
	(s)	,03	,02	,02	.02	.03	.05	--	--	*	--	--	--
Rv	(1)	,05	,12	,15	,24	,12	,12	,06	,08	,37	*	,23	,13
	(s)	--	--	--	--	--	--	--	--	--	*	--	--
Mc	(1)	.02	,12	,20	,12	,18	,32	,18	,03	,20	,22	*	,28
	(s)	--	--	--	--	--	--	--	--	--	--	*	--
Re	(1)	.06	,07	,09	,19	,07	,12	,03	,02	,10	,12	,27	*
	(s)	--	--	--	--	--	--	--	--	--	--	--	--

Source: Computed from Simplex Figures 2.3.c and 2.2.c

N.B. Each row comprises two lines, the first line shows the asymmetric Coefficients of Uncertainty in the layer generated by the distribution of Large Scale Plants and the second, those observed on the layer generated by the distribution of small scale establishments.

-- Not produced, for two different reasons;
a. the attribute Real Estate Capital is, *by definition* not an attribute of small plants
b. The distribution of these two attributes does not generate the requireda two by two contingency table.

* Asymmetric Uncertainty Coefficients associated with missing links in Figures 4.6.a' and 4.6.b' are shown as subscripts.

This of course does not imply that small plants on the Anatolian side do not depict concentrations. In fact they are. But concentrations are, at this scale not large enough to generate concentrations in terms of capital items. We are going to see that these properties are only slightly affected when category specific slicing parameters are used. (see Figure 4.6.b). It remains to be seen whether the particular industrial geography of small plants observed on the Anatolian side is related in some way to the capital intensive production environment in which they are working or not ? We ignore also whether this particular production factor deployment pattern can be taken as a macro level manifestation of certain types of sub-contracting relations or not? Finally, we ignore whether this differentiation which is invisible in quantitative terms, is explicable through historical factors or not ? But no matter how we choose to account for it, the discrepancy is detected and this illustrates that the proposed analytical procedure can be used in raising issues that would have remained hidden in quantitative studies.

2. It would be surprising to see the attribute N in large plants category, in an associative spatial relation with every other category of employment and Covered Area in Figure 4.6.a, and this, subsequent to our previous emphasis on the decentralized plant distribution patterns observed on the Anatolian side. If we recall that on the labor intensive industrial landscape of Istanbul side N is connected with only one category of employment (see Figure 4.4.a') this discrepancy which goes against the decentralized factor deployment patterns, necessitates explanation. This unexpected

result stems from the simple fact that, on the Anatolian side those places that do not meet the required treshold level in terms of number of plants (ie. those that comprise less than 13 large scale plants) do not meet the required levels in terms of employment categories as well. In other words, the relatively strong associative relation stems from the co-absence of N and employment categories. Notice also that, only 15 % of neighborhoods are important in terms of N while the same ratio is about three times larger on Istanbul side (42 %) . Hence, the relatively low spatial frequency of N on the Anatolian side reduces the strenght of the counter evidence and amplifies the strenght of the relation of spatial association. The situation would have been very different if in the formulation of the gamma index frequencies relative to combined absence of attributes were ascribed lower weights. The unexpectedly high number of links with N observed on Anatolian side is explicable through ;

a. the low spatial frequency of the attribute N on the Anatolian Side and,

b. the formulation of the index of areal association in which combined absences are weighted in the same way as joint presences.

Even if the index is probably not the most appropriate one, as far as N is concerned it is encouraging to see that in this capital intensive production space it is capable to detect that distributions of different items of capital and Uncovered area are largely independent from the distribution of plants. We are going to see that, when less binding slicing parameters are used, none of these links associated with N will be present.

3. Uncertainty coefficents amongst employment categories reveal a pattern that is rather dissimilar to the one observed on the labor intensive Istanbul Side. In fact here, Engineers and Technicians are not disconnected from Master Workmen, as they are observed on the Istanbul side. For the time being we ignore whether this difference is important or not ? Neither do we know whether the category Master Workmen refers to the same type of employment in labor and capital intensive trades. This, of course necessitates detailed analyses on the definition of tasks and responsabilities of Master Workmen in labor and Capital intensive trades. Literature on industrial sociology shows that with the deepening of capital intensity important changes have taken place in roles assumed by Master Workmen which started working as superviors. (Hirszowics, 1981: 99-124) In turkish we do not have this distinction and we use the word in accordance to the artisanal denomination. More research is needed to account for this differentiation. The limited geographic variation in Uncertainty Coefficients associated with Master Workmen as a predictor or as a dependent attribute suggest that this difference may not be a superficial one.

4. Finally, Tables 4.12 and 4.20 suggest non negligeable differences in Uncertainty Coefficients computed for different employment and land use categories. The same is true for those between categories of employment and capital. These differences, are considered as signs stemming from discrepancies between concentrated and decentralized production factor deployment patterns. Table 4.21 showing the lists of best predictors of each industrial attribute provides a summary of these differences.

Table 4.21 Comparison of the First Two 'Efficient' Predictors† of each Industrial Attribute in Istanbul and Anatolian Sides

	SMALL Plants: Attributes	SMALL Plants: Best Predictors*	LARGE Plants: Attributes	LARGE Plants: Best Predictors*
	N	← [Tc, MW] (a)	N	← [MW, Adm] (a)
	N	← [W, MW, Tc] (i)	N	← [MW] (i)
LABOR	Adm	← [En, W] (a)	Adm	← [W, MW] (a)
LABOR	Adm	← [En, MW] (i)	Adm	← [W, Mc] (i)
LABOR	W	← [Tc, UA] (a)	W	← [Adm, Tc] (a)
LABOR	W	← [MW, Tc] (i)	W	← [Adm, Mc] (i)
LABOR	MW	← [Tc, N] (a)	MW	← [Adm, W] (a)
LABOR	MW	← [En, W] (i)	MW	← [W, Adm] (i)
LABOR	Tc	← [MW, W] (a)	Tc	← [W, MW] (a)
LABOR	Tc	← [W, MW] (i)	Tc	← [Mc, Rv] (i)
LABOR	En	← [None] (a)	En	← [Mc, Tc] (a)
LABOR	En	← [MW, CA] (i)	En	← [Mc, UA] (i)
LAND USE	CA	← [W] (a)	CA	← [Adm, W, MW] (a)
LAND USE	CA	← [Mc, En] (i)	CA	← [UA, Tc, W,] (i)
LAND USE	UA	← [W] (a)	UA	← [CA, MW] (a)
LAND USE	UA	← [CA, Mc] (i)	UA	← [CA, Mc] (i)
CAPITAL	OF	← [UA, En] (a)	OF	← [Rv, MW] (a)
CAPITAL	OF	← [CA, Mc] (i)	OF	← [Rv, Mc] (i)
CAPITAL	Rv	← [None] (a)	Rv	← [OF, MW, Mc] (a)
CAPITAL	Rv	← [CA, Mc] (i)	Rv	← [OF, Mc] (i)
CAPITAL	Mc	← [None] (a)	Mc	← [En, Re] (a)
CAPITAL	Mc	← [CA, Rv] (i)	Mc	← [En, Tc] (i)
CAPITAL	Re**		Re	← [Mc, MW] (a)
CAPITAL	Re**		Re	← [Rv, Mc] (i)

Source : Derived from Tables 4.12 and 4.20

† Because of its *noisy* definition 'Administrative Personnel' is not included in the list of Best Predictors in small plants category.

* Best Predictors are selected in terms of their contribution to the Reduction of Uncertainty

** Missing by Definition.

(a) Denotes Anatolian Side
(i) Denotes Istanbul Side

At this scale and in large scale plants category eleven, out of a total of twelve lists of best predictors comprise, at least, one common attribute and that in eight of them, common elements occupy the first positions in the lists of best predictors.

This, of course, is a non negligeable similarity in the spatial organization of production factors in these two landscapes. High predictive capabilities of Master Workmen appearing in eleven different lists is specific to the capital intensive industrial landscape of the Anatolian side. (See Table 4.21) Recall that on Istanbul side, Master Workmen appeared in only one list of best predictors and played a minor role as a predictor of N.

Because of lack of comparable representations at this particular level of abstraction, it would not be relevant to carry out similar comparisons on industrial geographies of small plants.

Nonetheless, these results illustrating non-negligeable similarities in the spatial organization of production factors *and* the specific character of the capital intensive landscape of Anatolian side are important, for our understanding of the metropolitan production space and for formulating further studies on the same landscapes. It would therefore be relevant to check whether they are affected by changes in the scale of analysis or not ?

4.15 Industrial Geographies of Small and Large Scale Plants on Anatolian Side; Comparative Landscape Analyses based on Group Specific Slicing Parameters.

Uncertainty coefficients shown in Tablès 4.22 and 4.20 depict a noticeable spatial differentiation in terms of predictive capabilities. A visual comparison of Figures 4.6 (a-b) and 4.6 (a'-b') shows that the use of group specific slicing parameters leads to increases in Gamma indices. Changes in the values of uncertainty coefficients can be summarized as follows;

1. When group specific slicing parameters are used for N, the number of neighborhoods endowed with this attribute increases. Consequently, in large plants N is disconnected in Figure 4.6.a from the rest of attributes. Thus the distribution pattern of N is largely independent of other attributes. The opposite holds true in the layer relative to small plants, where group specific slicing parameters generates links between N and other industrial attributes (compare Figures 4.6 b' and 4.6.b).

As far as links with N are concerned, the use of group specific slicing parameters generates exactly the same effect on Istanbul and and Anatolian sides. N is connected (ie. it is in a relation of spatial association) with employment categories, Covered area and with different items of capital. This suggests a spatial differentiation in the predictive capabilities of N.

Table 4.22 Anatolian Side; Comparison of Asymmetric Uncertainty Coefficients** Derived from Small and Large Plants** (According to Category Specific Slicing Parameters)

Independent Attributes ↓		N	Adm	W	MW	Tc	En	CA	UA	OF	Rv	Mc	Re
			Dependent Attributes ↓										
N	(lc)	*	,03	,01	,00	,00	,00	,00	,00	,04	,02	,01	,01
	(sc)	*	,49	,34	,23	,22	,11	,32	,00	,07	,07	,09	--
Adm	(lc)	,03	*	,70	,41	,29	,25	,13	,19	,13	,14	,21	,16
	(sc)	,52	*	,23	,18	,34	,28	,36	,03	,29	,12	,12	--
W	(lc)	,01	,70	*	,46	,43	,37	,18	,22	,21	,23	,31	,25
	(sc)	,34	,22	*	,07	,19	,04	--	,00	,01	,01	,01	,07
MW	(lc)	,00	,41	,46	*	,29	,32	,13	,19	,13	,09	,15	,11
	(sc)	,24	,19	,07	*	,08	,05	,22	,00	,00	,05	,02	--
Tc	(lc)	,00	,28	,42	,28	*	,36	,11	,16	,18	,10	,20	,19
	(sc)	,24	,34	,21	,08	*	,37	,28	,02	,06	,18	,08	--
En	(lc)	,00	,25	,37	,32	,36	*	,09	,19	,20	,11	,30	,11
	(sc)	,11	,28	,05	,05	,37	*	,16	,01	,03	,07	,10	--
CA	(lc)	,00	,10	,15	,10	,09	,08	*	,16	,08	,04	,15	,01
	(sc)	,34	,37	,13	,22	,28	,16	*	,08	,17	,17	,15	--
UA	(lc)	,00	,19	,22	,19	,16	,08	,20	*	,13	,14	,15	,16
	(sc)	,00	,03	,00	,00	,02	,01	,08	*	,00	,00	,00	--
OF	(lc)	,04	,13	,20	,13	,18	,20	,10	,13	*	,38	,56	,15
	(sc)	,06	,27	,01	,00	,05	,03	,16	,00	*	,11	,02	--
Rv	(lc)	,02	,13	,21	,08	,09	,10	,05	,13	,36	*	,32	,10
	(sc)	,07	,11	,01	,05	,16	,06	,16	,00	,11	*	,05	--
Mc	(lc)	,01	,21	,30	,15	,20	,30	,18	,15	,56	,35	*	,23
	(sc)	,10	,12	,07	,02	,08	,10	,15	,04	,02	,05	*	--
Re	(lc)	,01	,16	,25	,11	,20	,12	,01	,16	,15	,11	,23	*
	(sc)	--	--	--	--	--	--	--	--	--	--	--	--

Source: Computed from Simplex Figures 2,4,c and 2,5,c and (according to category specific slicing parameter vectors,

N,B, Each row comprises two lines, the first line shows the asymmetric Coefficients of Uncertainty in the layer generated by the distribution of Large Scale Plants and the second, those observed on the layer generated by the distribution of small plants,

-- Not produced, the attribute Real Estate Capital is, *by definition*, not an attribute of small plants

* Asymmetric Uncertainty Coefficients associated with missing links in Figures 4,6,a and 4,6,b are shown as subscripts,

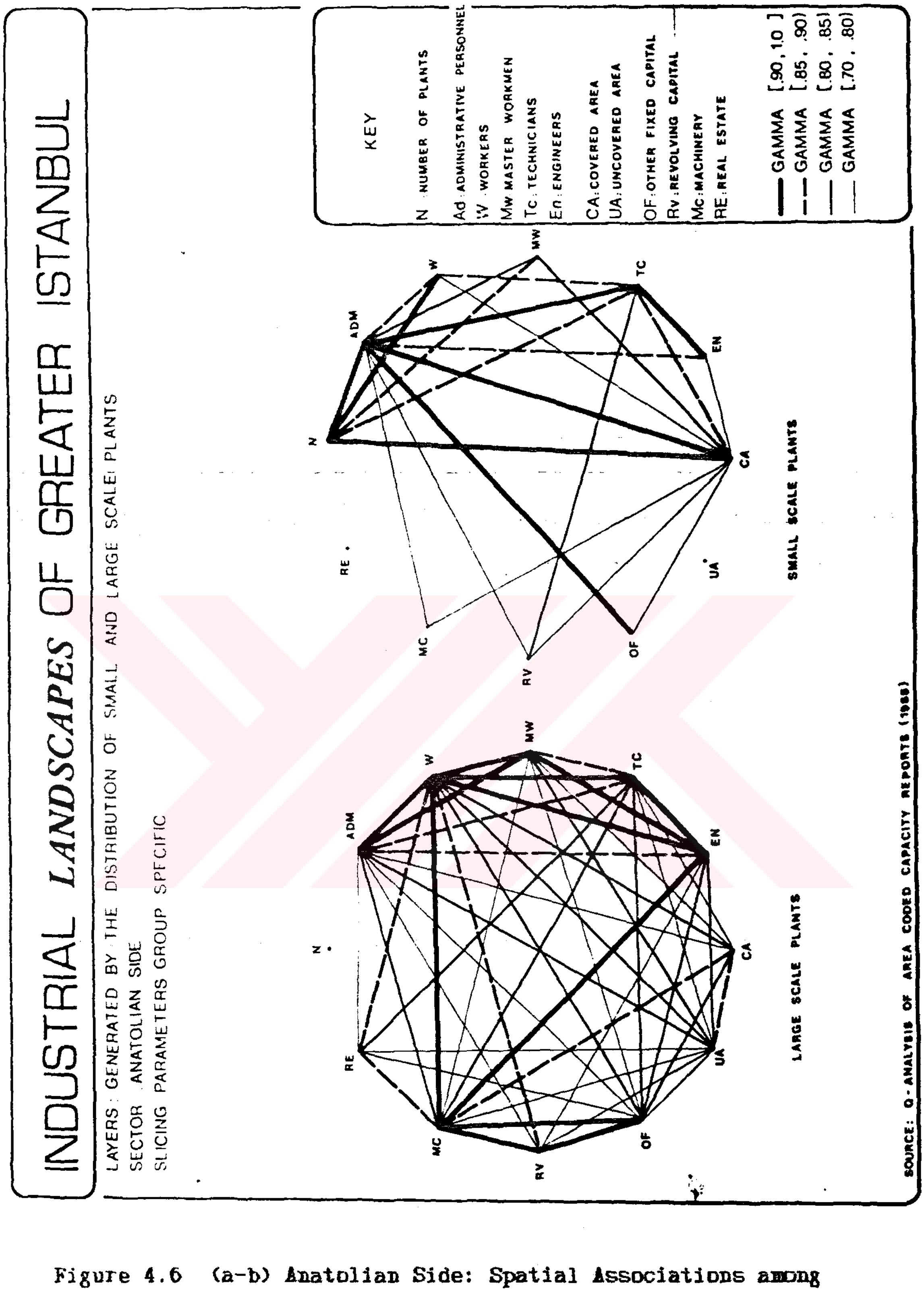


Figure 4.6 (a-b) Anatolian Side: Spatial Associations among Attributes in Large (a') and Small Plants (b') : Slicing Parameters: Group Specific.

2. Secondly, differences between Tables 4.20 and 4.22 suggest that group specific slicing parameters cause significant increases in Uncertainty coefficents among different categories of employment. Hence, under group specific slicing parameters employment categories become better predictors of each other. The same is also true for small plants category. As expected, these changes affect the list of best predictors and illustrate differences between labor and capital intensive landscapes.

3. Changes in the scale of analysis causes a reversal of predictive capabilities of different categories of employment over land-use categories. In fact, under category specific threshold levels, predictive capabilities of employment categories over Covered Area decrease considerably, while non negligeable increases are observed in the predictive capabilities of the latter over Uncovered area. Subsequent to these changes employment categories stand out as better predictors of Uncovered Area as compared to their performance in predicting Covered Area. In this regard there exists a major difference with the labor intensive industrial landscape of Istanbul side where latter property holds true in Engineers and Technicians only. (See Table 4.14)

4. Uncertainty coefficients derived from crosstables between different categories of employment and capital do not indicate significant changes in terms of reduction of uncertainty. Thus at this scale of analysis, we observe increases in some entries and decreases in others. However reductions of uncertainty remain in the same order of magnitude.

5. The comparison of Tables 4.20 and 4.22 shows remarkable changes in the predictive capabilities of Uncovered Area over different items of industrial capital. For instance Reduction of uncertainty for the pair of attributes UA → Mc increases from 3 % in Table 4.20 up to 15 % in Table 4.22. Thus the use of group specific slicing parameters affects most, the efficiency of Uncovered area as a predictor of other attributes. However when the predictive efficiency of Uncovered area over various categories of employment and items of capital increases, it becomes a less powerful predictor of Covered Area. In fact, the reduction of uncertainty computed for the pair UA → CA decreases from 29 % in Table 4.20 down to 20 % in Table 4.22.

6. Finally, we see that group specific slicing parameters cause, more often than not, noticeable increases the efficiency of items of capital in predicting other capital categories.
Thus, subsequent to these changes. , we obtain a different series of best predictors. Compare Tables 4.21 and 4.23. Modification of the scale of analysis affects most small plants, as attributes invisible in Figure 2.2.c, appear in Figure 2.4.c through group specific slicing parameters. As a consequence, in small plants only one attribute has common predictors .

Nonetheless, the specific character of the industrial geography of small plants located on the Anatolian side is seen at this particular scale too.

Table 4.23 Comparison of 'Efficient' Predictors[+] of each Industrial Attribute in Istanbul and Anatolian Sides (According to Group Specific Slicing Parameters)

	SMALL Plants: Attributes	SMALL Plants: Best Predictors*	LARGE Plants: Attributes	LARGE Plants: Best Predictors*
	N	← [CA, W] (a)	N	← [None] (a)
	N	← [W, MW,] (i)	N	← [None] (i)
LABOR	Adm	← [N, CA] (a)	Adm	← [W, MW] (a)
	Adm	← [W, Tc] (i)	Adm	← [Mc, En] (i)
	W	← [N, Tc] (a)	W	← [Adm, MW] (a)
	W	← [Rv, MW, ca] (i)	W	← [Re, Adm] (i)
	MW	← [N, CA] (a)	MW	← [W, Adm] (a)
	MW	← [W, Tc, ca] (i)	MW	← [W, CA] (i)
	Tc	← [En, CA] (a)	Tc	← [W, En] (a)
	Tc	← [Mc, MW, ca] (i)	Tc	← [Rv, Mc] (i)
	En	← [Tc, CA] (a)	En	← [W, Tc] (a)
	En	← [CA, Tc] (i)	En	← [Mc, W] (i)
LAND USE	CA	← [N, Tc] (a)	CA	← [UA, Mc] (a)
	CA	← [W, Tc] (i)	CA	← [Adm, Mc,] (i)
	UA	← [None] (a)	UA	← [W, En] (a)
	UA	← [CA,] (i)	UA	← [CA, En] (i)
CAPITAL	OF	← [CA, Rv] (a)	OF	← [Mc, Rv] (a)
	OF	← [W, Rv, ca] (i)	OF	← [Adm, Re] (i)
	Rv	← [Tc, CA] (a)	Rv	← [Mc, OF] (a)
	Rv	← [W, CA] (i)	Rv	← [Mc, Tc] (i)
	Mc	← [CA, En] (a)	Mc	← [OF, Rv] (a)
	Mc	← [W , Tc, ca] (i)	Mc	← [En, Rv] (i)
	Re**		Re	← [W, Mc] (a)
	Re**		Re	← [W, OF] (i)

Source : Derived from Table 4.22 which is based on Figures 2.5.c, and 2.4.c.

[+] Because of its *noisy* definition 'Administrative Personnel' is not included in the list of Best Predictors in small plants category.

* Best Predictors are selected in terms of their contribution to the Reduction of Uncertainty

** Missing by Definition.

(a) Denotes Anatolian Side
(i) Denotes Istanbul Side

Comparison of efficient predictors in small plants category suggests that only five out of eleven attributes have common predictors. Notice also that Master Workmen do not stand out as an efficient predictor in Anatolian side's small plants. Covered area present in eight different lists is the most efficient predictor in this particular landscape. In a sense, it assumes a role comparable to Workers on Istanbul side which appeared in seven different lists. It would be an error however to consider Covered area as being un-important on the Istanbul side. As shown in Table 4.23 Covered Area stands out as being the third efficient predictor in no less than five cases. If these cases are taken into consideration the number of lists with common predictors becomes as high as nine. In brief there exist elements that could be interpreted as stemming from spatial organization of production factors in small scale industries and those that reflect particularities of the environment in which they operate.

The impact of the modification of the scale of analysis is visible in the list of best predictors produced for large scale plants as well.

First of all, Master Workmen cease to be important in terms of their predictive capabilities. At this scale of analysis they are capable to account partially for the distribution of only two employment categories (Administrative Personnel and Workers.) and their distribution pattern seems to be independent from the distribution of other attributes.

Secondly, nine, out of twelve attributes possess at least one common predictor. This, surely is a sign of stability in industrial landscapes generated by the distribution of large plants.

But, if no less than nine, out of a total of twelve attributes have at least one common predictor, one can rightfully question whether Anatolian side is endowed with a distinct large scale industrial geography or not ? We are inclined to answer this question in the affirmative. In spite of these similarities a comparison of Figures 4.3.a and 4.6.a indicates differences in terms of connectivity patterns. In both sides, different items of capital and categories of employment are connected through high order links among themselves. However, it is exclusively on the Istanbul side that different categories of employment and capital exhibit high order associative relations *between* themselves.

Notice that this difference is also visible in Table 4.23 where rows related to Anatolian side show that different employment categories are efficiently predicted only through other categories of employment. The same is true different items of capital. Hence items of capital are predicted through other capital items.

This bi-partite division of efficient predictors, contitutes a significant difference between the industrial landscape of Istanbul side generated by a concentration of labor intensive trades and the one observed on Anatolian side shaped, by a concentration of relatively çapital intensive trades. (Güvenç, 1992)

CHAPTER V

CONCLUSION

The conclusion of this long study will be surprisingly short. The proposed analytical procedure works. In other words, it goes through abstract patterns shown in Figures 2.1 a to 2.5.c, decodes and deciphers their information content. Moreover, the procedure operates in discrete space. There are no linear filters, no rotations, no partitional algorithms. In other words the integrity of the geographical individual is preserved. After all etymologically individual means indivisible.

A good deal of useful information is mapped on our neighborhood simplices through the operation of slicing. In other words, incidence matrices produced in Figures 2.1 to 2.5 *are* multidimensional representations of the metropolian production space of Greater Istanbul as it is seen at explicitly stated scales of analysis.

The procedure decodes this information content. We have seen that even at 12 dimensions a formidable amount of useful information is loaded on our neighborhood simplices. For students of social sciences the explanation is in Lefebvre's (1974) *La production de l'espace' (1974) he says;*

> Representations of space encompass *all* the signs and significations, codes and knowledge that allow such material practices to be talked about and understood, no matter whether in the terms of everyday common sense or through the sometimes the arcane jargon of the academic disciplines that deal with spatial practices (engineering, architecture, geography, planning, social ecology and the like....)

The relevance of the proposed procedure in urban studies and planning is, of course obvious. Imagine we have land use map of a large metropolitan area and that its key contains more than 60 different entries. We may divide the city say into 500 subareas. Each one of these zones can be considered as geographic individuals of the study. Each one of them will depict a combination of land use types. Some land use types will be present and others not. In this case our sub-areas will be simplices, defined through a combination of vertices, in exactly the same way as our neighborhoods are defined on 12 different industrial geographic attributes.

If we repeat the same exercice we will obtain matrices of gamma indices which could be summarized in network type representations like Figures 4.1 a to 4.6.c expressing associative and repulsive relationships between land use types. We can use Uncertainty coefficients to determine the key variables (land use types) that generate important reductions of uncertainty in others. Notice also that our land use types are nominal variables therefore we will not even need slicing. If we repeat the same exercice in time, we will most probably obtain different diagrams. Differences between diagrams produced at time t and t+Δt will depict changes in the land-use system.

The same procedure can also be used to describe the spatial impacts of processes of industrial restructuring which, we know, manifests itself in a variety of forms; reductions in labor force, capital deepening, changes in the production process, de-skilling etc. (Massey and Meegan, 1982) In other words, if we have access to geographically coded data on the capital of plants their employment structure etc. (something like Area Coded Capacity Reports) we can observe processes unfolding *under the roofs of establishments* since this procedure measures the strenght of areal association among each pair of industrial attributes. Restructuring is likely to cause changes in the predictive capabilities of each attribute. These properties make this approch a useful analytical tool for geographical analysis. We do not claim that this approach is superior to those approaches that are already available. But, we think, we are allowed to consider it as one of the many ways of approaching multi-dimensional analysis of landscapes in general and of intra-metropolitan industrial landscapes in particular.

Notice also that when quantitative data is used there is an element of subjectivity that is introduced. But aren't we free to define individuals, population and the scale of our analysis as we like. Methodologicaly these choices are unavoidable whether they are stated explicitly or not, if they are clearly and explicitly stated, results will be replicable.

REFERENCES

Allen, G.C., 1929. The Industrial Development of Birmingham and the Black Country, 1860-1927, Geogge Allen and Unwin. London.

Burgess, E. W., 1925. "The Growth of the City: An Introduction to a Research Project", The City ,ed. R. E. Park, E W. Burgess and R.D. Mac Kenzie. Chicago, University of Chicago Press.

Carr, M., 1983. "A Contribution to the Review and Critique of Industrial Location Theory," Progress in Human Geography, Vol. 7, pp. 386-401.

Castells, M., 1975. Sociologie de l'Espace Industriel. Paris : Éditions Anthropos.

Dear, M and Scott, A.J., 1981. "Towards a Framework for Analysis", Urbanization and Urban Planning in Capitalist Society. eds. M. Dear and A.J. Scott, Methuen and Co. Ltd, London and New York.

Gaspar, J. and Gould, P., 1981. "An Applied Structural Analysis of Agriculture and Communication" , Space and Time in Geography. ed. A. Pred LUND, CWK, Gleerup. pp.183-214.

Gould, P., 1979. "Geography 1957-1977: The Augean Period". Annals of the Association of American Geographers, Vol. 69, No. 1 pp. 139-151.

Güvenç, M., 1989. General Industrial Geography of Greater Istanbul: An Exploratory Inquiry, Turkish Social Science Association Ankara. (Unpublished Report, 240 pages)

Güvenç, M., 1992. "General Industrial Geography of Greater Istanbul: An Exploratory Study" Development of Greater Istanbul, Greater Istanbul Municipality, Istanbul pp. 112-59. (Forthcoming)

Harris, B., 1985. "Synthetic Geography; The Nature of Our Understanding of Cities". Environment and Planning A., Vol. 17, pp. 443-464

Harvey, D., 1969. Explanation in Geography, Edward Arnold. London.

Harvey, D., 1973. Social Justice and the City, Edward Arnold. London.

Hirszowics, M., 1981. Industrial Sociology. Martin Robertson and Co. Ltd. Oxford

Hoover, E.M. and Vernon, R., 1959. Anatomy of a Metropolis Harward University Press Cambridge, Massachusetts.

Johnson, J.H., 1983 "Q-Analysis: a Theory of Stars", Environment and Planning B, Vol.10, pp. 457-69

Johnson, J.H., 1990 "Expert Q-Analysis", Environment and Planning B, Vol.17, pp. 457-69

Keeble, D. E., 1982. "Response to Sayer's Reply", Environment and Planning A, Vol. 14, pp. 124-128.

King, L.J., 1979. "The Seventies, Disillusionment and Consolidation", Annals of the Association of American Geographers, Vol. 69, pp. 155-157.

Kurre, J.A., 1986. "Additional Evidence on the Incubator Hypothesis: Detroit 1970-1975, Urban Studies, Vol. 23 pp. 429-434.

Lefebvre, H., 1974. La production de l'espace, Paris.

Massey, D. B. and Meegan, R. A., 1978. "Industrial Restrucçturing Versus the Cities", Urban Studies, Vol. 15, pp.273-288.

Massey, D. B. and Meegan, R. A., 1982. The Anatomy of Job Loss Methuen and Co. Ltd. London.

Massey, D., 1981. "The Electrical Engineering and Electronics Industries: Implications of the Crisis for the Restructuring of Capital and Locational Change", Urbanization and Urban

Planning in Capitalist Society, ed. M. Dear and A.J. Scott, New York Methuen, pp. 199-230.

Park, R. E., 1936. "Human Ecology" The American Journal of Sociology, Vol. XL, pp. 1-15.

Pred, A. R., 1964. "The Intra-Metropolitan Location of American Manufacturing", Annals of the Association of American Geographers, Vol. 54, pp. 165-180.

Sayer, A., 1982. "Explaining Manufacturing Shift a Reply to Keeble," Environment and Planning A., Vol. 14, pp. 119-125.

Scott, A. J. 1983. "Industrial Organization and the Logic of Intra-metropolitan Location I : Theoretical Considerations, Economic Geography, Vol. 59 pp. 233-250.

Scott, A. J., 1988. Metropolis: From the Division of Labor to Urban Form, University of California Press, Berkeley, Los Angeles, California.

Storper, M., 1984. "Who Benefits from Industrial Decentralization Social Power in the Labor Market, Income Distribution and Spatial Policy in Brazil", Regional Studies, Vol. 18. 2 pp. 143-164.

Storper, M., 1985. "Disequilibrium and Dynamics in Metropolitan Economic Development in the Third World: Reply to Townroe and

Hamer", Regional Studies, Vol. 19, pp. 51-57.

Struyk, R. J. and James, F. J., 1975. Intra-Metropolitan Industrial Location, Lexington Books D. C Heath and Co. Lexington Massachusetts, Toronto, London.

Tekeli, I., 1990. "A General Evaluation of the 150 Years of Planning Experience in Istanbul" (Unpublished Paper).

Tekeli, I., 1992 "Development of Urban Administration and Planning in the Formation of Istanbul Metropolitan Area" Development of Greater Istanbul, Greater Istanbul Municipality, Istanbul pp. 3-111. (Forthcoming)

Townroe, P. M. 1969. Locational Choice and the Individual Firm' Regional Studies, Vol. 3, pp. 15-24.

Townroe, P. M. and Hamer A. M., 1984. "Who Benefits from Industrial Decentralization Response to Storper," Regional Studies, Vol. 18. 143-164

Wise, M. J. 1949. "On the Evolution of the Jewellery and Gun Quarters in Birmingham," Transactions of the Institute of British Geographers, Vol. 15 pp. 57-72

APPENDIX

KEY FOR AREA CODES

This section provides place names for area codes shown in incidence matrices (Figures 2.1 to 2.5). Each column in these matrices represents a neighborhood that is important in at least one industrial geographic attribute. Area codes are written (upwards) according to the following format: -- .--.-- The field up to the first point (from the left) is the District code. The field in the middle of the two points is the sub-district code. Finally last two digit field to the right of the second point is the code for neighborhoods. Empty fields are omitted. Hence District 7 is shown as 7. (and not as 07.) Place names are presented according to the following format. Neighborhood names are related to codes that are *not* in parathesis

(--) : DISTRICT NAME written in capital letters

(--) Subdistrict Name (00) if it does not exist

-- Neighborhood Name

It is impossible for us to reproduce the associated neighborhood map here. It is available from the author, it should be available from Turkish Social Science Association as it is annexed to our exploratory quantitative study (Güvenç, 1989)

(01) : ADALAR

(00)

01 Büyükada
02 Heybeliada
03 Burgazada
04 Kınalıada
05 Marmara Adası

(02) : BAKIRKOY

(01) : Esenler

01 Namık Kemal
02 Davutpaşa
03 Mimar Sinan
04 Yavuz Selim
05 Nine Hatun
06 Fevzi Çakmak
07 Kazım Karabekir
08 Fatih
09 Menderes

(02) : Güngören

01 Haznedar
02 Merkez
03 Merkez
04 Akıncılar
05 Genc Osman
06 Çifte Havuzlar
07 Güneştepe
08 Güven
09 Mareşal Çakmak
10 Sanayi

(03) : KocaSinan

01 Şirinevler
02 Siyavuşpaşa
03 Soğanlı
04 Kocasinan
05 Cumhuriyet

(04) : Yeşilköy

14 Yeşilyurt
15 Şevketiye Yeşilköy
16 Ümraniye
17 Şenlik
18 Zümrüt Yuva

(05) : Bakırköy

01 Sakızağacı
02 Yenimahalle
03 Cevizlik
04 Zeytinlik
05 Ataköy (1. Kısım)
06 Ataköy (2. Kısım)
07 Ataköy (3. Kısım)
08 Ataköy (4. Kısım)
09 Zuhuratbaba
10 Kartaltepe
11 Osmaniye
12 Bahçelievler (Merter)
13 Tozkoparan
↓ (Nazif Gürman)

(06) : Sefaköy

01 Yeşilova
02 Beşyol
03 Gültepe
04 Sultan Murat
05 Kemal Paşa
06 Kartaltepe
07 Tevfik Bey
08 Söğütlü Çeşme
09 Fevzi Çakmak
10 Inönü

(07) : Küçük Çekmece

01 Cennet
02 Yenimahalle
03 Cumhuriyet
04 Kanarya
05 Fatih

(08) : Avcılar

01 Gümüşpala
02 Ambarlı
03 Avcılar
04 Kemal Paşa
05 Cihangir
06 Universite
07 Deniz Köşkler

(09) : Bağcılar (Yeşilbağ)

01 Barbaros
02 Çınar
03 Fevzi Çakmak
04 Inönü
05 Kazım Kara Bekir
06 Merkez (Yeşilbağ)
07 Sancaktepe
08 Yavuz Selim
09 Yenigün
10 Yıldıztepe

(10) : Yeni Bosna

01 Merkez
02 Fevzi Çakmak
03 Çoban Çeşme
04 Zafer
05 Hürriyet

(11) : Halkalı

01 Istasyon
02 Merkez

(12) : Firuzköy

(13) : Mahmut Bey

(14) : Altın Şehir

(15) : Atışalanı

(16) : Güneşli

(17) : Habibler

(18) : Ikıtelli

(19) : Kirazlı

(20) : Kayabaşı

(21) : Şamlar

(22) : Sultançiftliği

03 BEŞIKTAŞ

(01) : Beşiktaş

01 Vişnezade
02 Sinanpaşa
03 Yıldız
04 Cihannuma
05 Türkali
06 Muradiye
07 Abbasağa
08 Dikilitaş
09 Ertuğrul

(02) : Ortaköy

10 Mecidiye
11 Ortaköy
12 Balmumcu
13 Nisbetiye
14 Levent

(03) : Arnavutköy

15 Kuruçeşme
16 Arnavutköy
17 Kültür
18 Bebek
19 Etiler
20 Akatlar
21 Konak

04 BEYKOZ

(01) : Beykoz

01 Soğuksu
02 Çiğdem
03 Paşabahçe
04 Incirköy
05 Gümüşsuyu
06 Yalıköy
07 Beykoz
08 Ortaçeşme
09 Anadolukavağı
(10 Tokat Köy)
(11 Akbaba köyü)

(02) : Anadolu Hisarı

10 Yenimahalle
11 Göksu
12 Anadoluhisarı
13 Kavacık
14 Kanlıca
15 Çubuklu

(05) BEYOĞLU

(01) : Galata (Karaköy)

01 Ömer Avni
02 Pürtelaş
03 Kılıç Ali Paşa
04 Kemankeş
05 Hacı Mimi

06 Müeyyetzade
07 Bereketzade
08 Emekyemez
09 Arap Camii (Yeni Cami)

(02) : Beyoğlu

10 Şahkulu
11 Evliya Çelebi
12 Kemer Hatun
13 Asmalı Mescit
14 Tom Tom
15 Firuz Ağa
16 Cafer Hatun (Kuloğlu)
17 Hüseyin Ağa
18 Çukur
19 Kalyoncu (Kulluğu)

(03) : Taksim

20 Bostan
21 Hacı Ahmet
22 Yeni Şehir
23 Koca Tepe
24 Bülbül
25 Şehit Muhtar
26 Katip Mustafa Çelebi
27 Cihangir
28 Gümüş Suyu

(04) : Kasım Paşa

29 Bedrettin
30 Çatma Mescit
31 Yahya Kemal
32 Sururi Mehmet Efendi
33 Küçük Piyale
34 Hacı Hüsrev
35 Kaptan Paşa
36 Kulaksız
37 Kadı Mehmet
38 Camii Kebir ↓
Piyale Paşa

(05) : Hasköy

39 Keçeci Piri
40 Piri Paşa
41 Sütlüce

06 EMINONU

(01) : Alemdar

01 Cankurtaran
02 Alemdar
03 Molla Fenari
04 Emin Sinan
05 Binbirdirek
06 Sultan Ahmet
07 Küçük Ayasofya

(02) : Eminönü

08 Hocapaşa
09 Hobyar
10 Rüstem Paşa
11 Tahtakale

(03) : Küçük Pazar

12 Sarıdemir

13 Yavuz Sinan
14 Demirtaş
15 Hoca Gıyasettin
16 Hacı Kadın

(04) : Beyazıt

17 Sururi
18 Dayahatun
19 Beyazıt
20 Mercan
21 Süleymaniye
22 Balabanağa
23 Mustafa Kemal Paşa
24 Kalenderhane
25 Molla Hüsrev

(05) : Kumkapı

26 Mimar Hayrettin
27 Saraç isak
28 Mimar Kemalettin
29 Mesih Paşa
30 Katip Kasım
31 Nişanca
32 Muhsine-Hatun
33 Şehsuvar

(07) EYUP

(01) : Bayrampaşa

01 Yeni Doğan
02 Orta (Topkapı)
03 Vatan
04 Terazi Dere (Topkapı)
05 Altun Tepsi
06 Devrim
07 Muratpaşa
08 Kartaltepe
09 Yıldırım

(02) : Rami

01 Topçular
02 Yenimahalle
03 Rami Cuma

(03) : Eyüp

04 Defterdar
05 Nişanca
06 Düğmeciler
07 Islam bey
08 Eyüp Merkez
09 Silahtarağa
10 Esentepe
.. Sakarya

(04) : Alibeyköy

01 Karadolap
02 Merkez
03 Güzeltepe
04 Emniyettepe
05 Çırçır

(05) : Kemerburgaz

01 Göktürk
02 Ağaçlı
03 Kemerburgaz

04 Akpınar
05 Çiftalan Köyü

(08) FATIH

(01) : Fener

01 Haraççı Kara Mustafa Paşa
02 Küçük Mustafa Paşa
03 Abdi Subaşı
04 Tahta Minare
05 Balat Karabaş
06 Atik Mustafa Paşa
07 Molla Aşki
08 Avcı Bey
09 Kasım Gürani
10 Hızır çavuş
11 Hamami Muhittin
12 Katip Muhittin
13 Tevki-i Cafer
14 Hatip Musluhittin
15 Müftü Ali
16 Haydar
17 Kasap Demirhan

(02) : Karagümrük

18 Kocadede
19 Muhtesip Iskender
20 Mimar Sinan
21 Keçeci Karabaş
22 Beyceğiz
23 Derviş Ali
24 Kariye-i Atik
25 Hatice Sultan
26 Neslişah

(03) : Fatih

27 Kırkçeşme
28 Babahasan
29 Guraba Hüseyin
30 Murat Paşa
31 Iskender Paşa
32 Sofular
33 Hüsam Bey
34 Sinan Ağa
35 Kirmasti
36 Hasan Halife
37 Hoca üveyz
38 Şeyh Resmi

(04) : Şehremini

39 Molla Şeref
40 Nevbahar
41 Seyit ömer
42 Deniz Abdal
43 ördek Kasap
44 Arpacı Emini
45 Ereğli
46 Ibrahim Çavuş
47 Uzun Yusuf
48 Veledi Karabaş
49 Melek Hatun
50 Beyazıt Ağa
51 Fatma Sultan

(05) : Samatya

52 Inebey
53 Çakırağa

54 Keçi Hatun (Murat Hatun)
55 Kürkçübaşı
56 Cerrahpaşa (Hobyar)
57 Davutpaşa
58 Arabacı Beyazıt
60 Cambazhane (Cambaziye)
61 Hacı Hamza
62 Hacı Vahattin
63 Abdi Çelebi
64 Koca Mustafa Paşa
65 Yalı

(09) GAZIOSMANPAŞA

(01) : Gaziosmanpaşa

01 Merkez
02 Uç Şehitler
03 Bağlarbaşı
04 Sarıgöl
05 Yenidoğan
06 Karlıtepe
07 Yıldıztabya

(02) : Küçük Köy

01 Yenimahalle
02 Şemsipaşa
03 Fevzi Çakmak
04 Gazi
05 Hürriyet
06 Karadeniz

(10) KADIKOY

(01) : Kadıköy

01 Osmanağa
02 Caferağa
03 Rasimpaşa
04 Koşuyolu
05 Acıbadem
06 Hasanpaşa

(02) : Kızıltoprak

07 Zühtüpaşa
08 Fenerbahçe
09 Feneryolu
10 Fikirtepe
11 Eğitim
12 Merdivenköy
13 Göztepe
14 Devrim

(03) : Erenköy

15 Caddebostan
16 Suadiye
17 Bostancı
18 Yeni Sahra
19 Erenköy
20 Kozyatağı
21 Içerenköy

(04) : Küçük Bakkal Köy

01 Küçük Bakkal Köy

11 SARIYER

(01) : Yeniköy

01 Rumelihisarı
02 Emirgan
03 Reşitpaşa
04 Istinye
05 Yeniköy
06 Tarabya
.. Pınar

(02) : Sarıyer

07 Kireçburnu
08 Çayırbaşı
09 Büyükdere
10 Sarıyer
11 Yenimahalle
12 Rumeli Kavağı
13 Maden
14 Pınar

(12) SISLI

(01) : Harbiye

01 Mahmut Şevket Paşa
02 Paşa
03 Feriköy
04 Duatepe
05 Bozkurt
06 Eskişehir
07 Inönü (Altın Bakkal)
08 Pangaltı (Ergenekon)
09 Harbiye
10 Teşvikiye

(02) : Şişli

11 Talatpaşa
12 Gürsel
13 Izzet Paşa (Çiftliği)
14 Şişli Merkez
15 Halide Edip Adıvar
16 Halil Rıfat Paşa
17 Cumhuriyet
18 Halaskar Gazi
19 Meşrutiyet
20 19 Mayıs
21 Kuştepe
22 Mecidiyeköy
23 Gülbahar
24 Fulya
25 Esentepe

(03) : Kağıthane

01 Çağlayan
02 Yahya Kemal
03 Harman Tepe
04 Çelik Tepe
05 Emniyetevler
06 Yeşilce
07 Sanayi
08 Şirince (Şirintepe)
09 Kağıthane (Merkez)
10 Seyrantepe
11 Hürriyet
12 Gültepe
13 Telsizler

14 Ortabayır

(04) : Ayazağa

01 Ayazağa

(13) USKÜDAR

(01) : Usküdar

01 Selimiye
02 Ihsaniye
03 Ahçıbaşı
04 Barakiyeci Hacı Cafer
05 Barakiyeci Hacı Mehmet
06 Pazarbaşı
07 Murat Reis
08 Valide-i Atik
09 Tabaklar
10 Tavacı Hasan Ağa
11 Kopce Dede
12 Salacak (imrahor)
13 Ayazma
14 Ahmet Çelebi
15 Gülfem Hatun
16 Inkilap
17 Hayrettin Çavuş
18 Taygan Hamza
19 Selami Ali
20 Solak Sinan
21 Tembel H. Mehmet
22 Selman Ağa
23 Rumi Mehmet Paşa
24 H. Hema Hatun
25 Kuzguncuk
26 Icdadiye

(02) : Kısıklı

27 Barbaros
28 Altunizade
29 Kısıklı
30 Ferah
31 Yavuz Türk
32 Bulgurlu
33 örnektepe
34 ünalan

(03) : Beylerbeyi

34 Abdullah Ağa
35 Havuzbaşı
36 Küplüce
37 Beylerbeyi
38 Vaniköy
39 Emek
40 Kandilli
41 Küçük Su
42 Çengel Köy (kuleli)
43 Kirazlı Tepe
44 Güzel Tepe
45 Burhaniye
46 Emniyet
47 Bahçelievler

(04) : Umraniye

01 Atatürk
02 Namık Kemal
03 Istiklal
04 Inkilap
05 Çakmak (Site)

06 Mustafa Kemal
07 Kazım Kara Bekir

(05) : Aşağı Dudullu

02 Aşağı Dudullu
03 Çekme Köy

(06) : Yukarı Dudullu

06 Yukarı Dudullu
07 Esen Şehir
08 Reşadiye

(07) : Sarı Gazi

01 Sarı Gazi
02 Sarı Gazi (Dışı)

(08) : Sultan Çiftliği

(09) : Alemdağ

(10) : Yeni Doğan

14 ZEYTINBURNU

(01) : Zeytinburnu

01 Kazlıçeşme
02 Telsiz
03 Merkez Efendi
04 Maltepe
05 Yeni Doğan
06 Beştelsiz
07 Gökalp
08 Nuri Paşa
09 Yeşiltepe
10 Veli Efendi
11 Sümer
.. Seyit Nizam

15 ÇATALCA

(01) : Çatalca

01 Kaleiçi
02 Ferhat Paşa

(02) : Büyük Çekmece

01 Fatih
02 Dizdariye
03 Gürpınar

(03) : Hadımköy

01 Hadımköy

(04) : Eskinoz + Kıraç

01 Eskinoz (Esenyurt)
02 Kıraç

(05) : Anarşa + Yakuplu

01 Anarşa (Gürpınar)
02 Yakuplar

(06) : Kavaklı

01 Kavaklı

(07) : Tepecik

01 Tepecik

(08) : Mimar Sinan

01 Kumburgaz
02 Mimar Sinan
03 Güzelce (Çöplüce)
04 Murat Bey

(09) : Hoş Dere

01 Hoşdere

(10) : Bahsayiş

01 Bahsayis
02 Karaağaç
03 Çakmaklı
04 Ahmediye

(11) : Elbasan + Ovayenice

01 Elbasan
02 Ovayenice

(12) : SazlıBosna

(13) : Kabakça

16 KARTAL

(01) : Küçükyalı

01 Altıntepe
02 Küçükyalı
03 Çınar
04 İdealtepe
05 Aydınevler + Fındıklı

(02) : Maltepe

01 Bağlarbaşı
02 Feyzullah
03 Yalı
04 Cevizli
05 Gül Suyu

(03) : Soğanlık

01 Cevizli
02 Esentepe
03 Orta
04 Gümüşpınar
05 Yenimahalle

(04) : Yakacık

01 Topselvi
02 Yalı
03 Yeşilbağlar
04 Yeni
05 Çarşı
06 Kurfallı (Abdi İpekçi)

(05) : Pendik

01 Batı
02 Yenimahalle

03 Bahçelievler
04 Doğu
05 Kaynarca

(06) : Kartal

01 Orhantepe
02 Petrol-İş
03 Karlıktepe
04 Yukarı
05 Aşağı
06 Çacvuşoğlu
07 Yeni mahalle (Kurudere)

(07) : Tuzla

01 Postahane
02 Cami
03 istasyon
04 Yayla
05 içmeler

(08) : Dolayoba

01 Velibaba
02 Çınardere
03 Orta
04 Kurtuluş
05 Fevzi Çakmak

(09) : Aydınlı

01 Aydınlı

(10) : Güzelyalı

01 Güzelyalı

(11) : Başıbüyük

01 Başıbüyük Köyü

(12) : Kurtköy

01 Kurtköy

(13) : Şeyhli

01 Şeyhli

(14) : Yayalar

01 Yayalar

(15) : Samandıra

01 Samandıra

(16) : Orhanlı

(17) : Emirli

17 SILIVRI

(01) : Silivri

01 Piri Mehmet Paşa
02 Fatih
03 Alibey

(02) : Celaliye

01 Celaliye

02 Kamiloba
03 Sahil

(03) : Selim Paşa

01 Selim Paşa

(04) : Çanta Köyü

(05) : Beyciler

(06) : Büyük Çavuşlu

18 GEBZE

(01) : Gebze

01 Çayırova
02 Mustafa Paşa
03 Güzeller
04 Osman Yılmaz
05 Istasyon
06 Hoca Halil
07 Sultan

(02) : Darıca

01 Darıca

(02) : Hereke

00 Hereke
01 Çerkeşli
03 Kirazlıyalı
04 Kutluca
05 Naip
06 Sevindikli
07 Şemsettin
08 Tavşancıl

(03) Mollafeneri Bucağı

00 Akören
01 Balçık
02 Cuma
03 Demirciler
04 Denizli
05 Duraklı
06 Hatipler
07 Kadılı
08 Kargalı
09 Köseler
10 Mudarlı
11 Ovacık
12 Tepecik
13 Yağcılar

(19) : ŞILE

(20) : YALOVA

CURRICULUM VITAE

Citizen of Turkey, born in Ankara in 1953. Studied at Collège St. Joseph (Istanbul) and at the Department of City and Regional Planning (METU/ANKARA). Member of research teams in *Ankara Transport Master Plan*, (sponsored by Greater Ankara Municipality) and in Housing for Low Income Groups (sponsored by the IDRC of Canada) projects.

Teaches Urban Geography at the Department of City and Regional Planning of the Faculty of Architecture (METU). Participates since 1982, in planning studios.

Co-author in *Ankara from 1985 to 2015*, (1987), *Ankara'da Sanayi* (Industry in Ankara) (forthcoming) and in *Development of Istanbul Metropolitan Area* (forthcoming).